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ADDRESS AT THE ANNUAL GENERAL MEETING

THE RIGHT HON. THE LORD RENNELL OF RODD, K.B.E., C.B.

AS OUTGOING PRESIDENT I feel I should give account of my stewardship for the last three years. I therefore propose to summarize what has happened and how far the policy announced in my previous addresses has been worked out. While it will be for you to assess the results, I have been very encouraged by the support we have had at the evening meetings, film meetings, and technical afternoon meetings. In spite of the fact that more meetings have been held each month, they have been more fully attended this session than ever before in the Society's history. There have also been held in the Society's House five meetings of the Institute of Navigation, and meetings of the Geographical Association and the Public Schools Exploration Society.

Since the last Annual General Meeting, 5279 Fellows and 2485 other visitors have used the Society's House. The number of books taken out of the Library has increased to 5689, compared to 5246 last year. The Fellowship of the Society has grown to 5866 from 5010 at the end of 1945. The number of elections this year, 548, is again a record. The apparent membership of 5866 must not however be taken as an entirely accurate figure since the sad number of deaths of Fellows cannot be ascertained for some months. But the apparent figure of 5866 compares with the apparent figure of over 5500 which I was able to announce this time last year. In addition, we have at present 91 Associate Members.

This evidence of interest in geography and in the activities of your Society is as significant as it is encouraging. It is clearly related to the increase in geographical teaching and the number of geographical students at universities in this country. It also reflects the realization of people that the life and history of mankind are directly concerned with the geographical circumstances of the communities into which mankind is divided. All history is conditioned by geography, without which it cannot be understood and is meaningless; but more than that, geography colours almost equally the spiritual and social structure of mankind. Thus the very range of geography in its widest sense must lead one to regard it as the bond between natural science and the humanities, between the material and abstract worlds. So it is fitting that

we should try, as we have done, to blend in this Society all aspects of geography in its widest terms and in its most extended activities. We have sought to encourage geography in the field: this year we have helped or are helping to send out expeditions to Arabia, East Greenland, Iceland, West Spitsbergen, Lapland, Norway, Switzerland and the Gambia. And here I would like to emphasize that in making possible the despatch of such expeditions, each one of you as Fellows of the Society has a share. We have also been privileged to record achievements in the field by Professor Ahlmann and Professor Pettersson of Sweden; Dr. Christopherson and Dr. Strøm of Norway; Captain Mikkelsen and Mr. Ebbe Munck of Denmark; and Professor Dexter Perkins of the United States of America. We have given support for research in experimental physical geography, notably to a party which this year is to begin an investigation of the surface and submarine structure of the Chesil beach—work which I would like to see taken overseas in the near future. Another party is to undertake experiments on the Aletsch Glacier near the Jungfraujoch Research Station. We have assisted to promote mathematical geography, through the Institute of Navigation, in civil aviation and in modern methods of cartography. We have published original research in maps and papers, and we have also sought to "popularize" geography by our close association with the *Geographical Magazine* and with the makers of films, professional and amateur. We have further developed our work in the academic and social fields. I think the people of this country and especially scientific circles have come to regard the Society as the British centre or forum of geography; and this side of geography is well represented on the new Council which you will be asked shortly to elect. We have decided to award a Travelling Fellowship in Geography and have awarded an annual University Essay Prize open to students of British universities for geographical research papers and essays. We have been instrumental in securing the appointment of geographers to geographical posts in the Colonies. The *Geographical Journal* has become the organ in which particulars and news of these developments as well as of university work generally is published.

This really notable activity has only been made possible by the administrative arrangements on the Council which I foreshadowed in my address to you in 1946. The various branches of the Society's activities, which I have very briefly outlined, are discussed and dealt with by a series of committees of your Council. These committees are the Finance Committee, of which I shall have more to say presently; the Research and Expeditions Committee; the Publications and Editorial Committee; the Survey Committee; the Library and Map Committee; the Committee on Medals and Awards; the Joint Polar Research Committee and the Education Committee. The last of these is the latest committee to be formed and to it have been passed all matters concerned with teaching, prizes, fellowships, curricula, teaching material, educational films and so on. The committee has already more than justified its existence; it has among other activities made contact with publishers of geographical books—to, I hope, the future benefit of both parties. Some of these committees meet regularly, others when required. By a rule of Council the chairman of each committee must be a member of Council, but otherwise the chairmen and their colleagues are free to choose the committee

members from the Fellowship of the Society and outside. Joint meetings of committees are of course held when subjects overlap. The activities of the committees are followed by your President and Council who see the agenda and minutes, but the chairmen only report to Council or seek guidance, when necessary, on matters of higher policy, retaining a very free hand which alone makes it possible for your Officers and Council to direct the whole range of activity.

Here I must say that the Finance Committee, which administers the financial policy of the Society under the chairmanship of Mr. L. Brooks, one of your Honorary Secretaries, has relieved the President and Council of a great deal of detailed work with which, under present conditions, they would never have been able to cope. Your and my very sincere thanks are due to Mr. Brooks and his colleagues for their successful labours.

I must also draw attention to the amount of work this organization has thrown on the Director and Secretary, Mr. Kirwan, and his office staff, who are, of course, also responsible for the day to day administration of the Society. I would also like to refer to the excellent work of the Librarian and Map Curator, Mr. Crone, and his staff who have had to cope with unprecedented demands for both books and map information, and have in addition had to deal with the vast volume of cartographical material which has resulted from the war. It is to one member of the Map Room staff, Mr. Day, assisted by Mr. Crowther, that the great improvement in our film facilities has been very largely due. I wish to make a special reference to the work of the Drawing Office under our head draughtsman, Mr. Holland, not only as regards publications in the *Geographical Journal* but in other directions to which I shall refer later. They have set a very high standard in map production which, as was pointed out not so long ago in the daily press, is a model for geographical work of this kind.

In addition to the range of activities described, the Society is represented either by members of Council or by the permanent staff on the following committees and external bodies: the National Committees for Geography, for Geodesy and Geophysics, and on Airborne Research of the Royal Society; the Electoral Board of the Professorship of Geography, Cambridge; the Faculty Board of Geography and Geology, Cambridge; the Committee for Geodesy and Geophysics, Cambridge; the Geophysical Committee of the Royal Astronomical Society; the Committee of the Scott Polar Research Institute; the Permanent Committee on Geographical Names; the Himalayan Committee; the Galapagos Islands Committee; the Discovery Committee; the Polar Committee; the Great Barrier Reef Committee; the Joint Committee of Anthropological Research and Teaching; the Geography Committee of the Education Panel of the British Film Institute; the British School of Archaeology in Iraq; the Geographical Magazine Trust; the Council for the Promotion of Field Studies; the British Ship Adoption Society; U.N.E.S.C.O. National Cooperating Body for Social Sciences; the Institute of Navigation; the Colonial Office Scientific Committee on the Falkland Islands Dependencies Survey.

Your President is *ex officio* Chairman of the Trustees of the Trust Fund of the *Geographical Magazine*, the success of which enterprise is directly related,

as you know, to the provision of funds for geographical work. The foresight and generosity of those who were responsible for creating the Trust Fund has already enabled much to be done in the field and at the desk.

On the material side we have been able to restore and redecorate a substantial part of the Society's House. A lot more remains to be done, notably in the lighting of this Hall, in the Museum and in many of the offices. We have been fortunate in securing a new cine-projector with funds from the Geographical Magazine Trust. We have also, as I think you know, a film-viewing and cutting room for the use of Fellows and lecturers to the Society.

The policy of holding exhibitions continues. The exhibition on Civil Aviation at Christmas attracted 7023 visitors and enjoyed the support of the Ministry of Civil Aviation, the Air Corporations and other bodies. Owing to the redecoration of the Ambulatory and new Map Room, it was regrettably not possible to hold an Easter exhibition this year. The series of major exhibitions will I hope be resumed at Christmas with one on the history and progress of navigation through the ages, organized in conjunction with the Institute of Navigation which is housed in the Society's buildings. This summer we have had a small exhibition of drawings and water-colours from the Society's collection illustrating journeys in different parts of the world by explorers who were Fellows of the Society. We now have in the Ambulatory a display of maps prepared by Departments of His Majesty's Government which will be on show later this year at the International Geographical Congress at Lisbon, at which your Society will be represented.

On the cartographic side, in addition to the preparation of original material for publication and the preparation of maps and slides to illustrate papers read at meetings, the Society is also preparing a series of outline maps for inclusion in guides to places of historic and other interest in this country which are being produced by the British Travel Association. Only lack of staff has prevented the Society from undertaking further orders for map drawing and compilation by other official and national bodies which I would have liked to see undertaken here. Two other interesting developments have occurred in the cartographic sphere. The British Association for the Advancement of Science recommended at its meeting in Dundee last year that the scheme for a National Atlas, promoted before the war, be revived. The matter was then fully discussed by the National Committee for Geography of the Royal Society and by your Council. A scheme has now been evolved which has the support of the Royal Society to create an *ad hoc* body to compile and publish a National Atlas, in which this Society will play its appropriate part. A National Atlas to illustrate the demography, geology, physiology, ecology, and history of the country is long overdue. Its object will be to make accessible to the public here and abroad in one volume the very considerable cartographic material which in fact is available in the country though widely dispersed. In this respect we are materially as advanced as many other countries but we have, as is so often the case, failed signally hitherto to display our wares. The scheme is designed to remedy this.

The second development is the cleaning, restoration and remounting of the famous 'Mappa Mundi' in Hereford Cathedral. This unique possession is a map of 1295, probably the only one of this early date in existence in the world.

It was compiled by an Englishman and survives happily in very good condition. But it was in need of cleaning, remounting and displaying in a more dignified and worthy setting. The Dean and Chapter of Hereford Cathedral gladly accepted a suggestion I made that the Society should undertake this national task, and your Council agreed to defray the expenses from the Andrews Bequest for cartographical work and study. The 'Mappa Mundi' has been cleaned by the Map Department of the British Museum, remounted and worthily framed in oak. It will be returned to Hereford Cathedral in its new setting and site with an appropriate inscription recording the task accomplished by the Society. The opportunity has also been taken to photograph and examine the map; the results will in due course be published in a special publication on sale at the Society's House and in Hereford Cathedral.

Among the sad losses suffered by the Society this year are the Earl Baldwin of Bewdley, who was a Life Fellow of the Society and was elected as long ago as 1910; Dr. Vaughan Cornish, an academic geographer well known for his work on ocean waves, historical and strategic geography, and as a practical supporter of the movement for the preservation of rural England; Professor Rodwell Jones who, after distinguished service in the first world war, joined Sir Halford Mackinder's staff at the London School of Economics and succeeded him as head of the department from 1925 to 1945; Sir Cecil Clementi, colonial administrator and Governor of Hong Kong from 1925 to 1930; Dr. John Parkinson, an authority on the geology of East and West Africa; Commander G. B. Spicer-Simson, R.N., the first Secretary General of the International Hydrographic Bureau; and Mr. J. L. Chaworth-Musters, a well known traveller closely associated with the British Museum (Natural History). On the other hand it gives me, and I am sure you also, great pleasure to be able this afternoon to place on record the addition of the name of that great Englishman, Mr. Winston Churchill, to our small list of Honorary Members. Mr. Churchill has been a traveller in many lands and as an historian and strategist has contributed much to a fuller understanding of the importance of geography in strategy and war. Our new Honorary Member, distinguished in so many fields, will add lustre to the annals of our Society.

With this auspicious announcement I close the last address I shall have the honour to give to the Society as President. May I add how glad I have been to have had the privilege of presiding over the Royal Geographical Society with which my forebears have been so closely associated, and how sincerely I wish the Society well in the great and useful future which lies before it.

AN EXPEDITION TO THE LLOYD GEORGE MOUNTAINS, NORTH-EAST BRITISH COLUMBIA

F. S. SMYTHE

Evening Meeting of the Society, 15 December 1947

THE NORTH-EAST PORTION of British Columbia is among the least known areas of Canada. Between the Peace River in the south and the Liard River in the north there is a mountainous country some 25,000 square miles in extent which is largely unmapped and unexplored. This area, which is bounded on the west by the Finlay and Kechika Rivers and on the east by the Alaska Highway, forms a part of the Rocky Mountain limestone system. It is a wilderness of mountains extending up to, and possibly over, 10,000 feet in height, and its valleys with their dense forests, narrow canyons and swift glacial rivers make travel extremely difficult.

From the early years of the last century the Peace and Finlay Rivers have been used as a means for trade by canoe between the Hudson Bay Company and the Indians, and posts were established at Fort Grahame and Fort Ware on the Finlay River. It was also along the Finlay, and over the Sifton Pass between the headwaters of that river and the Liard, that the prospectors passed in the gold rush of 1898, and many are said to have perished there on their way to Whitehorse and the Klondike.

For many years Indians, trappers and prospectors brought back tales of high mountains and lakes to the north-east of Fort Ware, but the first man officially recorded as having travelled in this region was R. G. McConnell of the Geological Survey of Canada who, in 1893, set off from Fort Ware up the Kwadacha River. He reached the junction of the Kwadacha with the Warneford River, and looking up the latter saw high snow mountains to the north. These peaks were again observed in 1914 from a mountain near Fort Ware by Frank Swannell of the Dominion Survey, who fixed their position by rays.

Fired by the accounts he had heard of these mountains an American, Paul Leland Haworth, set out from Prince George in a canoe with a single companion in 1916.[1] Following the Parsnip River to Finlay Forks and the Finlay River to Fort Ware, he endeavoured to ascend the Kwadacha. Progress proved so slow and difficult that he was forced to retreat owing to lack of food, but not before he had climbed a hillside and seen in the north a mountain range supporting an extensive icefield whence rose three upstanding peaks. This range he named Lloyd George after the Prime Minister of Great Britain whom he greatly admired. The Survey of Canada has since followed his nomenclature by naming other ranges in the area Churchill, Roosevelt and Stalin.

[1] Haworth's account of his journey was published in his book, 'On the headwaters of Peace River,' New York, 1917, and in an article under the same title in *Scribner's Magazine*, 61 (1917) 647–68 and 62 (1917) 58–73.

Fig. 1. Northern Canadian Rockies

Haworth returned in 1919 with a stronger party.[1] This time he made a topographical error and, instead of following the Warneford River which would have led him to the Lloyd George range, he followed the Kwadacha River and was forced in the end to make a cross-country journey through the bush. This so exhausted the party that when at length Haworth, with Dr. Alban P. Chesterfield, reached the southernmost end of the six-miles-long lake named after him, he was able to continue only a mile or so along the shore towards the Lloyd George mountains, which rise beyond its northernmost end.

The first exploration of the country between the Lloyd George range and the Peace River was made in 1932 and 1934 by the Bedaux Sub-Arctic (Citröen) Expedition. In 1932 horses were taken to Trimble Lake about 100 miles north of the Peace River, and in 1934 the expedition continued its explorations northwards. Leaving the settlement of Taylor on the Peace River on July 16 they proceeded via the Halfway River using tractors, but on August 7 they abandoned these and continued with pack horses. On August 31 they reached the Muskwa River 35 miles east of the Lloyd George range, turned west up that river, and on September 7 crossed the Bedaux Pass at the southernmost extremity of the range; then proceeding via Chesterfield Creek and the Warneford and Kwadacha Rivers they reached Fort Ware on September 13, having completed a journey of 355 miles from Fort St. John and 907 miles from Edmonton. This pioneer journey through some of the most difficult country in north-west Canada ended on September 22 on the Fox River, 111 miles north of Fort Ware. Later the expedition returned the 460 miles from Fort Ware to Taylor by canoe. They had travelled the 52 miles from Chesterfield Lake to Fort Ware in four marches, a remarkable performance in view of the dense bush and steep and narrow valleys, and rendered possible only by the strength of the expedition which included more than twenty cowboys and axemen.

The geographer of the expedition was Frank Swannell, and he made an excellent map of the route and its environs to a scale of one inch to 7·89 miles. This map possesses the unusual feature of being signed by all the members of the expedition including the axemen and cowboys.

In 1946 while in Canada I talked over with Major Rex Gibson of the Canadian Alpine Club the possibility of an airborne expedition to Haworth Lake, and later wrote to him initiating it. The expedition consisted of the following: Henry Hall of Boston, a member of the American Alpine Club; John Ross, President of the Harvard University Mountaineering Club; David Wessel of Bozman, Montana; Rex Gibson of Edmonton; Nöel Odell of Cambridge; my wife and myself.

The expedition had as its principal objects the exploration of the Lloyd George range; the making of as accurate a sketch-map as possible; a geological survey by Odell, and a collection of herbarious specimens of the flora and silva by myself for the Royal Botanic Garden, Edinburgh. My wife came as cook and general organizer of the expedition and was invaluable in both capacities.

The expedition came together at Jasper, Alberta, in June 1947 and at the

[1] Paul L. Haworth, "The Quadacha country and Mount Lloyd George," *Scribner's Magazine*, 67 (1920) 714–28.

end of the month left in two parties, one for the seaplane base at Fort St. James and the other for Fort Nelson. Those of us who travelled to Fort St. James had an inauspicious start from Jasper as an aircraft crashed on the station, the pilot being killed; then, owing to two trains being wrecked, we arrived a day late at Fort St. James. However, we were met at Vanderhoof on July 2 by a cheerful Welsh taxi-driver named David Jones, and driven 45 miles to Fort St. James, the base for the seaplanes of the Central British Columbia Airways Corporation.

When we arrived at the office of the Corporation we found that the officials knew nothing about us, although we had corresponded for several months previously and had arranged for an aircraft. It transpired that the Managing Director had left the firm and before doing so had placed our correspondence in a file marked "Miscellaneous" which no one had bothered to open since. However, the new Managing Director promised us an aircraft for that afternoon, July 2, and after lunch we packed ourselves and our gear into a small, all-metal Junkers float-plane with a single Pratt and Whitney engine.

Our pilot was Mr. Pat Carey, one of those skilful and intrepid bush pilots who have done, and are doing, much to open up the Canadian North-West. In this type of flying the pilot is entirely dependent upon his own skill and judgment. There is no radio direction-finding, no local weather reports and the maps he must work from are mostly to a scale of one in a million with large areas completely blank. I asked the pilot what he would do in the event of the single engine failing and there being no lake or river to land on. His reply was: "I guess I should put her down on the bush, she's strongly made and would plough through the tree-tops like a toboggan."

We took off at 11.45 and flew north past Pinchi Lake where there is a mercury mine, and between Chuchi and Tchentlo Lakes to Germansen Lake. The weather was good and the visibility excellent, the Coast Range 150 miles distant being clearly visible. After Germansen Landing, which is now linked by road with Fort St. James, we did not see a trace of a habitation in the next 200 miles, nothing indeed but a wilderness of mountains intersected from north to south by the great valley down which the Finlay River flows to Finlay Forks.

We crossed the river north of the Hudson Bay post of Fort Grahame. Up to this point the pilot knew the country, but he had not been in the direction of the Lloyd George range. I was seated beside him in the cockpit and was now prepared to assist in the navigation, but there was no need for this as 80 miles ahead the range was already in view, its icefield shining out from between the clouds.

As we crossed the Kwadacha River and its steep-sided valley clothed in dense forest, we could appreciate the difficulties Haworth experienced in his journeys. It seemed strange and almost cruel to his memory that we were flying to his lake which took him many weeks of canoeing and bush-whacking to reach, very easily and comfortably between lunch and tea. Then, to the east, Chesterfield Lake appeared. A few minutes more and we swung round the range west of it and there was Haworth Lake, an intense turquoise blue in colour, set like a gem-stone amidst the snowy peaks of the Lloyd George range.

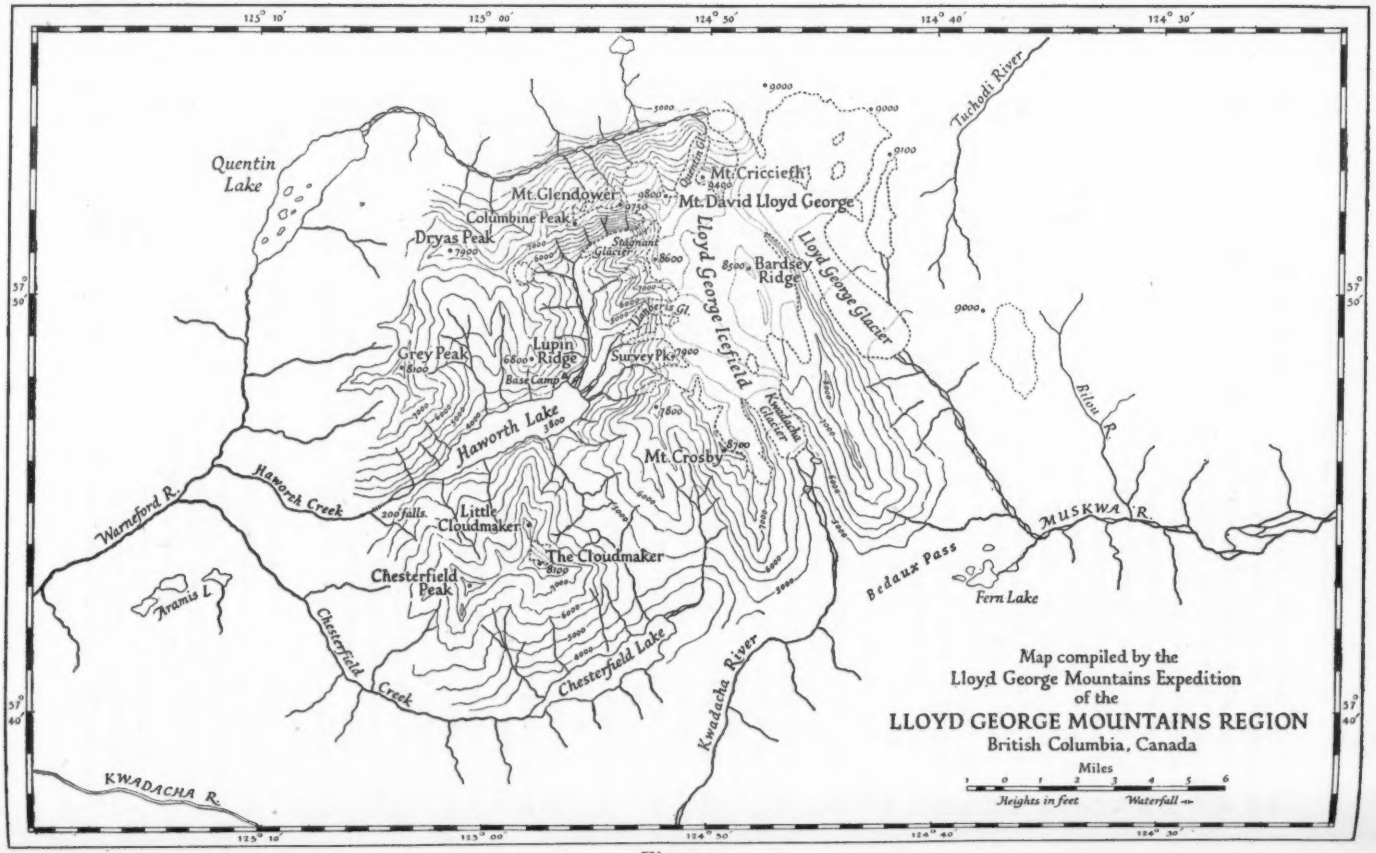
125° 10′
125° 00′
124° 50′
124° 40′
124° 30′
57° 50′
57° 40′
Quentin Lake
Mt. Glendower
9800
Columbine Peak
9750
Dryas Peak
7900
Stagmant Glacier
8600
Mt. Criccieth
9400
Mt. David Lloyd George
Bardsey Ridge
8500
Lloyd George Glacier
Lloyd George Icefield
Tuchodi River
9000
9100
Grey Peak
8100
Lupin Ridge
6800
Base Camp
Survey Pk.
7900
Haworth Lake
3800
Mt. Crosby
8700
7800
Kwadacha Glacier
Riley R.
Warneford R.
Haworth Creek
200 falls
Little Cloudmaker
The Cloudmaker
8100
Chesterfield Peak
Aramis L.
Chesterfield Creek
Chesterfield Lake
Kwadacha River
Bedaux Pass
Fern Lake
MUSKWA R.
KWADACHA R.
Map compiled by the
Lloyd George Mountains Expedition
of the
LLOYD GEORGE MOUNTAINS REGION
British Columbia, Canada
Miles
1 0 1 2 3 4 5 6
Heights in feet
Waterfall

Figure 2

We landed on the lake at 14.05 after a flight of 2 hours and 20 minutes over an estimated distance of 281 miles. The moment we climbed out of the aircraft and stepped on to the shore we were assailed by the furious and voracious inhabitants of the surrounding forest and muskeg—mosquitoes. This is a problem every traveller to north and north-west Canada has to face and it is essential to have tents fitted with nets. Most mosquito repellants are effective for a short time, far less than their optimistic makers state. In this case we had one called "Skeetofax." In the form of cream it was only effective for a few minutes, but as an oil it kept even the Canadian mosquito off for hours, sometimes as long as five hours after a single generous application.

Our base camp was pitched at a height of 3800 feet at the north-west corner of the lake. The site was not ideal and we could find no better pitches for the tents than some low mossy ridges rising a few inches above the surrounding swamp.

The plane left that afternoon for Fort Nelson and returned next morning with the remaining three members of the expedition.

The weather changed for the worse the day after our arrival and continued unsettled till the end of the month, with only a few days of fair weather and those often broken by afternoon thunderstorms. As we learned afterwards, the summer of 1947 was exceptional for its heavy precipitation along the Canadian Rockies, the rainiest summer since 1907 according to official records. At the same time the Pacific coast experienced a drought and later, when my wife and I visited Victoria Island, we were to find the country brown and parched, a most unusual circumstance.

During the first days of bad weather we occupied ourselves in making small reconnaissances of the surrounding country, and in constructing chairs, tables and other amenities of civilization, including a properly constituted kitchen for my wife. As the result of this, but principally of her own work and skill, we had served to us large, varied and tastefully cooked meals at all hours of the day and night.

On July 4 the aircraft returned with the remainder of our provisions and equipment. It was then utilized for a three hours' reconnaissance flight over the surrounding country by Hall, Odell and myself, while Gibson, Wessel and Ross set off to reconnoitre a route to the main icefield of the range.

The first leg of the flight was north-north-west to the headwaters of the Gataga River which have their origin in the mountains named the Churchill range by the Survey of Canada. This is a totally unmapped and unexplored group of mountains, and the peaks, typical of the sedimentary limestone of the Canadian Rockies, are mostly of about the same height between 8000 and 10,000 feet. The highest peak of the range had been observed from the air and named Mount Churchill, but we saw no outstanding peak, whilst the group of lakes indicated on the map did not appear either. We observed no lakes or rivers in this region suitable for landing an aircraft, and to penetrate this country with its labyrinthine ranges and forest-clad valleys and canyons would be a long and arduous undertaking. The map also indicates a mountain named Mount Roosevelt, 9500 feet, north of the Churchill range at the headwaters of the Racing River. We did see in this area an isolated and distinctive peak which we circled and photographed.

Our next leg was south-east to Tuchodi Lake. This lake, 15 miles long, was the only stretch of water we saw, apart from Haworth, Chesterfield and Quentin Lakes, on which an aircraft could be landed. One aircraft had already been landed on it and the pilot reported the lake to be packed with fish. Some 8 miles to the east there rises a 9500-foot mountain which the survey authorities, in conscientious pursuance of the system of nomenclature invented for this country, have named Mount Stalin. Actually there is a group of three peaks here, all dark grim-looking mountains, with one slightly higher than the others.

Our third leg was south-south-east to the Redfern range. The map marks a lake here which should be accessible from the Alaska Highway 40 miles to the east, or by the route taken by the 1934 Bedaux (Citröen) Expedition from Fort St. John. There is a fine group of mountains here. One has been named Redfern Mountain and another Great Snow Mountain. The weather however had deteriorated, and dark clouds piling up in the south already concealed the range. We decided to abandon the flight and return to Haworth Lake. This was to prove a most fortunate decision.

Flying south-south-east from Tuchodi Lake we soon approached the Lloyd George range. It was our first comprehensive view of the icefield, which is some 30 to 35 square miles in extent. If the glaciers flowing from it be taken into account, the total area of ice in the range is at least 60 square miles. We could also see the three highest peaks of the range, and it was evident that two of them were easy of access from the icefield. The third stood apart from the icefield and looked more difficult of approach.

The most impressive feature of the range is the glacier which falls from the icefield toward Haworth Lake. It forms a continuous icefall of over 4000 feet, one of the longest in the Canadian Rockies. Gibson's party was, we knew, attempting to force a route up it to the icefield but we could see no trace of them. In fact they were immediately beneath us on the icefield and of course could see us as we swooped around.

Satisfied with our inspection, which gave us much of the information we required, we descended and landed on the lake. Half an hour later, as we were enjoying our tea, a heavy thunderstorm accompanied by a violent line squall arrived. Had we continued the flight to Redfern Lake we might not have found our way back. Later, despite continued bad weather and a cloud ceiling of only 2000 feet above the lake, the pilot took off for the Hudson's Bay Company's post at Fort Ware where there is a petrol dump and it is possible to land on the Finlay River. It was a striking example of his experience and skill in mountain flying.

Meanwhile Gibson's party had caught the full force of the storm on the exposed icefield. So bad was the weather that Gibson, unwilling to accept the risk of exposure on the icefield, decided not to retreat by his line of ascent from the point he had reached near the north-west end of the latter, but to attempt a direct route down the cliffs below it. This was only achieved after some most difficult climbing, and the party did not return to the base camp until 10.30 p.m. Their expedition had solved the problem of reaching the icefield. From a mountaineering angle it was a *tour de force*.

After this the weather continued bad for several days. During this period

we visited the northernmost branch of the valley in which lies Haworth Lake, where we found a stagnant glacier about 2 miles in length and less than half a mile wide, enclosed by rock cliffs 4000 feet in height. This glacier was covered with stones and earth in which small trees, shrubs and plants were growing. Odell estimated that the ice had lain there for hundreds, perhaps thousands of years, melting but little owing to the small amount of sunlight received and the amount of debris that had fallen upon it from the crumbling limestone cliffs.

I was able at this time to begin a herbarium collection of the flora, in which work I was ably assisted by John Ross. The flora of the Rockies is not to be compared with that of the Alps or Himalaya in the number and variety of its species, yet it has its charm and on the lower meadows, the stream beds and the open slopes above timberline many beautiful species were found. According to Dr. J. M. Cowan, Assistant Keeper of the Royal Botanic Garden, Edinburgh, nearly every specimen collected in the area is mentioned by Rydberg and Raup.[1] Owing to the warm air currents from the Pacific the distribution of plants along the Canadian Rockies between latitudes 50° and 57° is substantially the same throughout, except that in the Lloyd George region some sub-arctic species begin to creep in. The general motif was similar to that of Jasper and Banff National Parks, except that in the Lloyd George area blue-flowered plants predominated. On the lower slopes were massed delphiniums, lupins, blue borage, polemoniums, astragalus, myosotis, mertensia and gentians. And between this carpet of blue shone out brilliantly such plants as the red and yellow Indian paint-brush, a beautiful red and gold columbine, and purple and yellow asters. Above 5000 feet many of the same species were present but in dwarf form. Over 6000 feet there was a kind of mossy tundra in which the typical cushion plants of the high mountains flourished, such as the *silene acaulis*, *saxifraga*, minute almost stemless daisies and other composites, golden potentillas and a very dwarf forget-me-not of as brilliant a blue as the *eritrichium nanum* of the Alps.

The weather continued unsettled until July 15. During this period we rigged a wireless transmitting and receiving apparatus but found that although we could receive we were unable to transmit to Fort Nelson as had been arranged, due to the screening effect of the mountains.

Owing to the dense bush surrounding us we saw comparatively little of the animal life except moose and porcupine, one of which raided the stores and had to be shot, but tracks were observed of elk, caribou and wolf, and above the timberline Rocky Mountain goat and big-horn sheep. A large brown bear was also seen close to the stagnant glacier.

On July 7, during the course of a reconnaissance round the lake shore, axe cuts estimated to be at least twenty years old were observed on some trees, probably made by the local Siwash Indians who are based on Fort Ware, or perhaps by some wandering trapper or prospector. So difficult to penetrate was the bush along the lake shore that we constructed a raft made of five

[1] P. A. Rydberg, "Phytogeographical notes on the Rocky Mountain region," a series of articles in *Bull. Torrey Bot. Club*, vols. 40–6, New York, 1913–19; and H. M. Raup, "Phytogeographic studies in the Peace and Upper Liard River regions, Canada," *Contr. Arnold Arboretum*, vol. 6, Cambridge Mass., 1934.

dead but not rotten logs out of which the sap had dried, and this was launched by my wife with great ceremony and christened the *Nona*.

On July 10 two new routes, one of them easy, were made to the icefield at its south-east extremity, and some minor peaks were climbed, one of which was found to contain a large number of marine fossils. On July 14 routes were reconnoitred from the stagnant glacier up Mount Glendower, 9750 feet, the name suggested for the second highest peak of the range, and the following morning we rose at 3 a.m. and set off to climb the mountain. Hall, Gibson and Ross were to ascend by a steep gully 4000 feet in height from the stagnant glacier, while Odell, Wessel and I made a route which struck the south-west ridge of the mountain at a lower point.

The second party reached the ridge without difficulty but when we attempted to traverse the ridge we found ourselves cut off by a deep gap. To descend it would have involved risking an avalanche on a slope of soft, freshly fallen snow. We returned, and late in the afternoon saw the other party completing the ascent of the summit snow-slopes after much step-kicking and step-cutting in the gully followed by a drag over soft snow on the south-west slopes of the mountain.

The weather improved somewhat and on July 17 the whole party, excepting my wife, who pluckily agreed to remain alone at the base camp, set out to climb Mount Lloyd George, 9850 feet, the highest peak of the range. In perfect weather we followed the route up the icefall discovered by Gibson's party. It is neither safe nor easy. For an hour the climber runs the gauntlet from the toppling séracs of the glacier, and then he must climb some steep slabby rocks overhung by the 100-foot-high wall of crumbling ice.

When, after some five hours of climbing, we reached the icefield it was to find the snow so soft that advance became very slow and fatiguing. Snow at this latitude does not consolidate as it does in the Alps, and this would seem to be due to the relatively small temperature variations between night and day and also between different altitudes. These conditions are largely due to the low elevation of the sun and the shortness of the nights which prevent extremes and excessive radiation; also to the climate which is affected by the warm air from the Pacific. The best technique for traversing soft and deep snow is for the leader to go ahead as hard as possible for a few minutes; his place is then taken by the next man who does likewise.

Before us across the gently sloping expanses of the icefield we could see our objective, Mount Lloyd George. It looked close at hand but it took a good three hours under a broiling sun to bring us to the foot of its final peak. We halted for lunch on a scree-patch and then set off to complete the ascent. The going was easy up the south ridge, and when at length we approached the summit we climbed a steep little wall of snow immediately beneath it merely as a gesture, as it could have been avoided.

The ascent had taken ten hours. It was a happy occasion, for our three nationalities had pulled together as one man. The weather also was brilliant, the finest day granted to us as yet. Beneath, to the south-east, stretched the immaculate expanses of the icefield. Beyond rose ridge upon ridge of mountains. In the north were the limestone peaks of the Churchill range, steep and wall-sided. From them the eye passed north-west across the Kechika River

The south-east ridge of Mount Lloyd Geor

Main icefield from summit of Mount Lloyd George

Central Lloyd George massif and Haworth Lake. Central peaks are, left to right, Glendower, Lloyd George and Criccieth.

to the granite formations of the Cassiar range, then west and south-west along the Omineca range. There were some fine granite peaks visible, sharper and steeper than those around us. Southwards lay the great Rocky Mountain Trench, the geological fault down which the Finlay River pours its waters towards Finlay Forks. South-east were the peaks of the Redfern range, a fine group of mountains and well worth the attention of the mountaineer. To the east and north-east a jumbled array of snowy peaks extended towards the Alaska Highway, the nearest point of which was some 70 miles distant. It was interesting to reflect that in all this vast agglomeration of mountains, extending over 100 miles in all directions, not a single major peak had been trodden.

The mean of several barometers denoted a height of 9800 feet for Mount Lloyd George, and a bubble theodolite disclosed that it was 50 feet higher than Mount Glendower.

Owing to the soft snow the descent took almost as long as the ascent, and our previous tracks, deep though they were, collapsed beneath us so that we wallowed up to our knees while crossing the icefield. As a result we did not reach camp until 10.10 p.m., where we were welcomed by my wife who had ready for us tired and hungry climbers a magnificent four-course meal.

During the latter two weeks of July a survey of the area was made from a base line in the valley and three survey stations were established, two of them on eminences above the level of the icefield. The third highest peak of the range, Mount Criccieth, 9400 feet, was climbed, and observations made on the glaciers which flow into the Tuchodi and Muskwa Rivers. The easternmost extremity of the icefield was also visited, and several peaks in its vicinity ascended, including Mount Crosby, 8700 feet, which had been named by the Bedaux (Citröen) Expedition. During this period Odell completed his geological survey [1] and I my collection of flora and silva.

Two further expeditions were made. One was the traverse of Mount Lloyd George and Mount Glendower. This was the best mountaineering expedition we had, and was first-class even from an Alpine standpoint. It occupied twenty-one hours, and the route along the narrow snow ridges between the two peaks might be compared with that to Mont Blanc via the Aiguille de Bionnassay.

Another ascent was that of the twin-headed peak, 8100 feet, to the south of Haworth Lake. We had named this the Cloudmaker for its tendency to manufacture local clouds and storms. It appeared an easy climb from the valley to the north of it, but to reach this valley involved much difficult bush-whacking around the shores of the lake. The alternative was to employ our raft, and on this somewhat precarious contraption Wessel and I set out on the morning of July 22 carrying with us food for three days, but no tent or sleeping bags as we intended to travel both light and fast. If our speed was no more than a mile an hour it was several times faster than forcing our way through the bush along the shore. Keeping as close as possible to the shore, we poled and paddled round the head of the lake and along the east side.

We were about five yards from the shore when, on turning a small point,

[1] A summary of the geology is given in N. E. Odell, "Exploration of the Lloyd George Mountains in the northern Canadian Rockies," *Nature* 161 (1948) 327–8.

Wessel suddenly called my attention to a bear. The bear was light brown in colour with deep sunken eyes and was far larger than a grizzly. It was identical in type with the specimen shot by Belmore Brown, now in the New York Natural History Museum, which weighed 1550 lb. and stood about 8 feet high. Our bear was not so large but appeared a formidable creature. For a moment it eyed us, then rushed into the lake and commenced to swim towards the raft. We had no weapon and were far too slow to escape, especially as we were in deep water and could use only the paddle.

The bear made straight for my end of the raft. As I was astride the raft with my back to it, it was essential to turn round and face it so that I could wield my paddle, our sole defensive weapon. Reversing position on a raft is a difficult manoeuvre at any time. As my weight came on one foot the raft canted steeply and I found myself overbalancing into the water. At the last moment I managed to turn round and transfer my weight to the other foot, the raft lurched back, and I was in the reverse position facing our assailant, paddle in hand.

It was the second occasion on which I had been attacked by a bear and I remembered the words of Jack Hargreaves, a renowned hunter, "Stand your ground and make yourself known." There was no question of not standing my ground, and in no small measure did I make myself known. I yelled at him and at the same time beat with my paddle at the water between us, hoping to scare rather than enrage him. But this was without effect; he still swam on powerfully and quickly. In another moment he would seize the raft. The time had come for more direct action. I uttered a yell, even louder and shriller than before, and raised my paddle intending to hit him on the nose, the most sensitive portion of a bear's anatomy, but before I could bring it down, his head suddenly turned and in another moment he was making for the shore. He landed, then, in a series of great bounds, crashed off through the bush. "Holy Mackerel!" remarked my companion, who throughout this encounter had been standing immobile at the other end of the raft without realizing the importance of joining in the noise: "I sure would have liked to photograph him."

Half an hour later we tied up the raft and struck out through the bush. For a time we followed a stream until we came upon an excellent game trail which led us through the bush without any difficulty for the next two miles, keeping high up above the gorge down which the stream we were following flowed towards Haworth Lake. The game trail presently petered out, but we could see our way ahead and presently emerged into the valley north of the Cloudmaker, whose waters flow to both Haworth and Chesterfield Lakes.

We found the valley floor to consist of open meadows ablaze with flowers. Along this beautiful valley we made our way, then turned up a shallow gully through the forest, cut out by snow avalanches, which led us without difficulty to the uppermost slopes of the lower peak of the Cloudmaker. We gained the summit without difficulty by 2.15 p.m., and an hour later set off for the higher summit.

As we climbed up easy slopes of snow and rocks the weather quickly deteriorated and thunder began to sound in the east. Leaving our rucksacks we hastened on, hoping to reach the summit and return before the storm

Junkers float-plane on Haworth Lake, with Cloudmaker in backgrou

Cloudmaker from Little Cloudmaker

Author with Junkers float-plane at Fort St. James

broke, but the ridge we were on abutted against a steep wall of rocks some 200 feet high. As these would require some time to climb and the storm was now fast approaching, we decided to take shelter on the lee side of the ridge.

We had not long to wait for the storm. The lightning seemed to gush out of the dark clouds as they approached, and the thunder detonated as though some barrage was creeping upon us. Then, suddenly, there was a vivid glare and a tremendous Bang as the lightning struck the top of the mountain, then another glare and a second Bang.

It is interesting to note that in a storm on a mountain two types of lightning discharge may occur. In the first the charged cloud builds up on the mountain or else approaches slowly from elsewhere. This results in the setting up of a gradual tension and an ionization of the air which lessens the resistance between cloud and earth until the rising tension results in a flash-over along the ionized column of air. It is this type of discharge which produces such characteristic preliminary effects as hair standing on end and hissing metal objects, and it provides an unmistakable warning to mountaineers to leave exposed crests and ridges. It may however occur without a flash-over and serve to neutralize the cloud. In the second type a charged cloud is blown more quickly against a mountain. This results in a sudden and enormous tension of far higher potential than that just described. Thus the flash-over is far more powerful and destructive. So a thundercloud that approaches a mountain quickly from a distance gives less warning of its intentions and is to be feared more than the one that forms about the mountain.

On the Cloudmaker the discharges were violent and we experienced none of the preliminary phenomena alluded to. Drifts of hail poured down upon us. They were succeeded by denser falls until everything was blotted out and the rocks hissed and seethed with the rushing pellets. Then came a burst of violet light and a tremendous explosion. For a few moments I was blinded and could see nothing but darting streams of fire. At the same moment my legs felt as though they were being driven down into the rock by some irresistible force while the soles of my feet were stabbed by innumerable needles. My sight returned and I could see my companion a few yards away through the pouring hail. We grinned at one another and I made the unnecessary remark that the flash was a close one.

After this flash there was silence, one of those strained and ominous silences that sometimes occur in a thunderstorm before a particularly violent discharge. Then came another explosion. This time I distinctly saw the stream of fire as it rushed down to strike the mountainside just below Wessel before I was once again blinded by its brilliance. This time however I felt less shock and it was Wessel who had the narrower escape.

It was Jove's last effort. He withdrew over Haworth Lake though he was well supported by his pluvial rearguard which continued to drench us with hail, sleet and rain.

We were now in a miserable plight, soaked to the skin and shuddering uncontrollably both from the cold and the effects of the lightning. Down we went to our kit and huddled on everything we had, then without pause glissaded down the snow slopes that descend to the north of the mountain.

We had descended some 1500 feet when we stopped and decided to return and complete the ascent of the Cloudmaker. So back we toiled over the now interminable snow-slopes. We regained our former halting place and now it was merely raining, sleeting and blowing. The rocks above were streaming wet, and to avoid a difficult climb we traversed eastwards seeking for an easier line. We found one and were soon building a cairn on the summit of the mountain.

The rain and sleet had ceased. Around us rose dark and sullen mountains and beneath us Haworth and Chesterfield Lakes gleamed green and cold. Somewhere in the west Jove's chariots were rumbling on their way, but in the south-east, faint and far beyond the edge of the rain clouds, some shapely snow-peaks glowed in the setting sun.

Down we went in a race against darkness to timberline. We won it and spent the last of the daylight collecting dead timber for an all-night fire. It was a beautiful spot, a glade set betwixt the spruce and balsams. The rain stopped as we heated our cocoa and the stars were spread between the tree-tops. Our meal over, we sat by the fire pleasantly steaming in our drying clothes. We were warm now, well fed and contented. It was Wessel who summed up the experiences of the past sixteen hours: "Well, Frank, I guess we can call it a day."

On July 30 the aircraft returned and transported us in two parties back to Fort Nelson and Fort St. James.

Air cooperation and supply have already aided the explorer and will continue to aid him in the remoter regions of this earth. What we proved is that a small expedition, given only a suitable lake or river as landing ground, can quickly and easily avoid the weeks and even months of travel by pack-train and canoe in north-western Canada. Aircraft offer a far quicker and more economical means of approach to such areas otherwise difficult of access as those to the east and west of the Finlay and Kechika Rivers, and there is enough unmapped and unexplored country in them to keep geographers, mineralogists, geologists and mountaineers occupied for many generations to come.

Since this paper was written and the map reproduced on p. 162 was drawn, the Survey of British Columbia has reduced by 300 feet all estimates of height made by the expedition.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon LORD RENNELL OF RODD) said: This evening a paper on "An expedition to the Lloyd George Mountains, north-east British Columbia" was to have been read by Mr. F. S. Smythe and Dr. N. E. Odell. Dr. Odell is at present touring the Swiss universities and has been unable to return in time to be with us this evening. Mr. Smythe, who in more respects than one was the originator of the expedition in the company of Major Gibson of the Canadian Alpine Club, will therefore read the paper alone.

Mr. Smythe is going to describe what, apart from being geographically an interesting expedition to the high mountains of north-east British Columbia,

is remarkable for having been almost the first expedition of this sort whose supplies and lines of communication were maintained by air. This conception of the expedition is due to Mr. Smythe and Major Gibson. They decided that the only practical way to explore and survey the area lying between the Alaska Highway and the Finlay River in the short time available was to fly the party in. Previous attempts to reach and explore the range by land had been frustrated by the miles of bush to be crossed. As you will see, the results of the expedition show what modern technique can do for geographical travel in opening up regions hitherto almost inaccessible, or accessible only with great difficulty by ordinary overland routes.

Mr. Smythe then read the paper printed above.

The HIGH COMMISSIONER FOR CANADA (Mr. Norman Robertson): It has been a great pleasure to be here to listen to the lecture. It will be agreed, I am sure, that the expedition has amply illustrated what Canada owes to air travel and transport for opening up parts of the country still unknown and difficult to reach by any other means. The expedition was also a happy illustration of the interest taken by English explorers in the North West of Canada.

A FELLOW: Is it possible for Mr. Smythe to give further details of the wild life of the area explored? Was there any life in the rivers, any bird life, any wapiti or moose?

Mr. F. S. SMYTHE: Haworth Lake was teeming with fresh-water shrimps; moose came quite close to the camp; caribou, elk, bear, mountain goat and sheep were also seen. The animals were similar to those to be seen elsewhere in the Rockies, except that the bear was undoubtedly the Alaskan bear.

The PRESIDENT: We regret that Dr. Odell was unable to be with us, but I think it would be an understatement to say that Mr. Smythe has, with his pictures, fulfilled our expectations of what an address of this description should be. I have rarely seen colour photographs so pleasing or giving so full a sense of mountain scenery as those Mr. Smythe has shown to-night. No doubt that is largely due to the technical skill with which the photographs were taken. We all join in thanking him for an interesting evening.

THE BOUNDARIES OF LOCAL GOVERNMENT AREAS

E. W. GILBERT

Afternoon Meeting of the Society, 24 May 1948

MY SUBJECT this afternoon is complex. Nevertheless geographers must concern themselves with the current problems of Society and of the State however difficult the task may be. Geographical questions concerning the boundaries of local government areas have interested British geographers in the past and are of pressing importance to-day. Nearly thirty years ago Sir Halford Mackinder asserted that "the Oceanic peoples must strive to root ever more firmly their own organisation by localities, each locality with as complete and balanced a life of its own as circumstances may permit of," and added that this is "precisely what the real Freedom of Men requires—scope for a full life in their own locality." [1] These words are as true as when they were first written.

It is not possible to give an adequate geographical account of the many problems connected with the boundaries of local government areas in the short space of one lecture: I can only draw a picture in outline. Nor is it possible to say anything very original as most of the ground has been covered already, notably by Professor C. B. Fawcett in his 'Provinces of England' (1919). My own previous work on the subject is contained in a paper on "Practical regionalism in England and Wales," [2] and Professor E. G. R. Taylor opened a discussion on "The geographical aspects of regional planning" [3] to which I sent a contribution. Both these papers were mainly concerned with the division of the country into large units, and I feel it is now very necessary for geographers to consider the boundaries of the smaller administrative areas as well as to re-examine those of the larger ones. The problem of local government areas, large and small, should be treated as a whole.

There is no doubt that the present system of local government areas in England and Wales is in many respects out of date: the needs of local administration have long outgrown the existing framework of boundaries. In the words of *The Times* (9 April 1948) "the petrol engine, the telephone, vast shifts of industry and population have transformed the human map of England while leaving the local government map essentially unchanged." It would be difficult to make radical changes in the boundaries of local government areas without reorganizing the system as a whole. The problem is not merely a matter of revising the existing boundaries: it is a question of creating new types of unit more consonant with the geography of the country as it is at the present day. Unfortunately, while there is almost complete agreement on the necessity for change of some kind, there is extreme diversity of opinion as to the design of any alternative structure.

[1] H. J. Mackinder, 'Democratic ideals and reality,' pp. 254 and 266, London, 1919.
[2] *Geogr. J.* 94 (1939) 29–44.
[3] *Ibid.* 99 (1942) 61–80.

This paper is divided into three parts: the first is a brief account of the existing structure of local government areas; the second points out four main ways in which the structure is out of date and criticizes the system from a geographical angle; the third part describes the remedies which the Local Government Boundary Commission propose to apply and discusses how far the suggested treatment will cure the geographical ailments already outlined. In the following account of the existing structure the case of London is generally omitted as the geographical complications of London's government need a separate paper if not a whole book.[1]

THE PRESENT STRUCTURE OF LOCAL GOVERNMENT AREAS

What then is the geographical structure of local administration in England and Wales?

Geographical Counties.—There are in England and Wales 52 ancient or geographical counties. These areas include the county boroughs which lie within their boundaries. Local patriotism, the salt and savour of English life, is closely linked with the geographical counties, which are not the actual units of administration (Fig. 1).

Administrative Counties.—These are only sixty years old. There are 62 of them, each with a County Council, and they were created by the Local Government Act of 1888 (Fig. 2). The 10 additional counties are made up of two from Yorkshire (Ridings), two from Lincolnshire (Parts), one each from Sussex and Suffolk, the Isle of Wight, the Soke of Peterborough, the Isle of Ely, and the county of London. The administrative counties do not include the county boroughs. The administrative counties vary in population from Middlesex with 2·2 million inhabitants to Rutland, the smallest, with only 18,000. Nearly 25 million people live in 61 administrative counties and a further 3·1 million live in the county of London.

County Boroughs.—There are now 83 county boroughs, that is towns with the status of a county. Of these, 61 were declared county boroughs in 1888, including the 13 ancient "counties of towns," the cities of Bristol, Canterbury, Chester, Exeter, Gloucester, Hull, Lincoln, Newcastle upon Tyne, Norwich, Nottingham, Southampton, Worcester and York. Since 1888 a further 24 towns have been promoted to the status of County Borough, while two (Hanley and Devonport) have been merged with others. Since 1926, when the process of obtaining county borough status was made more difficult, only one new county borough (Doncaster) has been created. The county boroughs have a total population of 13 millions, the largest (Birmingham) being a city of a million inhabitants, while the smallest (Canterbury) has 25,000 (Fig. 3).

During the period 1888–1926 the area controlled by county boroughs was continually growing at the expense of the counties. The 23 county boroughs which were newly constituted during those years took over 100,000 acres from the counties with 1·3 million people, while the original county boroughs, by extending their boundaries, removed another 250,000 acres of territory from the counties with a further population of 1·7 million.

[1] A full account of the subject is given in W. A. Robson, 'The government and misgovernment of London,' London, 1939.

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The county boroughs are described as "all-purposes" or "one-tier" authorities; they are quite independent of the counties. The right to apply for the status of a County Borough was limited in 1888 to towns having a population of 50,000 or more; in 1926 the limit was raised to 75,000 and in 1945 it was virtually raised to 100,000. Many proposals for promotion have been rejected. In a lecture on Oxford which I recently gave to this Society I described Cambridge as "a mere municipal borough." [1] The President of Queens' College, Cambridge has written to inform me that "a Bill promoting County Borough status for Cambridge was rejected by the Irish Nationalists in return for promised support by County Council representatives in relation to Irish affairs!" The Boundary Commission now proposes to raise Cambridge's status and to lower Oxford's; if this is done both towns will then have equal municipal standing.

There are 62 administrative counties and 83 county boroughs, making a total of 145 of these important authorities; they have been constituted the planning authorities for England and Wales by the Town and Country Planning Act of 1947.

The map (Fig. 3) shows that about half the county boroughs are in the seven great industrial areas, London, South and East Lancashire, the West Riding, the Black Country, the Potteries, the North East Coast and South Wales. The remainder are widely scattered and include industrial towns, ports, seaside resorts and cathedral cities.

County Districts.—The administrative units in the tier below the county are known as Municipal Boroughs, Urban Districts and Rural Districts. All are subject to the authority of the County Council in varying degree, and this system is sometimes called "two-tier" government. In England and Wales there are 1356 of these districts, each with a council: (*a*) There are 309 non-county boroughs, many of which are ancient creations. The largest of these has a population of 182,000 (Ilford), the smallest only 876. (*b*) Areas called Urban and Rural Districts were first created in 1894. There are now 572 urban districts, the largest with 211,000 inhabitants, the smallest with 707. (*c*) There are 475 rural districts, the largest with a population of 79,000, the smallest with 1200. The number of districts has been reduced since 1929, urban districts from 827 to 572 and rural districts from 779 to 475. In each of the three classes of district there is considerable variation in area and rateable value as well as in population.

Parishes.—The smallest units are the Townships or Civil Parishes, and these are the oldest units of local government in England; with few exceptions their boundaries remain as originally fixed centuries ago. There are about 14,000 civil parishes in England and Wales. Of these, about 7000 have parish councils and about 4000 have parish meetings. By the Local Government Act of 1894, every parish with more than 300 persons must have an elected parish council. There is an amazing range in the size of population of the parishes, which are not so homogeneous as one would imagine. In 1921 the Census recorded that 22 parishes had no inhabitants, that 2104 had under 100 each, that 4413 had between 100 and 300, while 301 had more than 20,000 each.[2]

[1] *Geogr. J.* 109 (1947) 3.

[2] 'Census of England and Wales, 1921. General report,' p. 29, London, 1927.

GEOGRAPHICAL CRITICISMS OF THE PRESENT SYSTEM

A mere recital of these facts, in the words of the Boundary Commission,[1] "gives cause for thought and affords a strong case on paper for fairly drastic alterations." What are the main geographical criticisms of the present system? It is best to begin with the smallest units and work upwards to the largest.

In the first place, the present system does not show sufficient regard for the smallest units of neighbours in country or town; parish councils are not as effective as they should be. The 'Scott Report'[2] states that "a properly elected parish council, meeting regularly in the village hall, is a very important instrument in the maintenance of village life." A book on 'Country planning' (1944), edited by C. S. Orwin, has shown how the parish council could be made more effective. The growing interest in parish councils was indicated by the formation, in 1947, of a National Association of Parish Councils with Lord Justice Scott as its first President.

There is no similar organization of neighbours in the towns. The Wards of towns are, in most cases, purely arbitrary electoral divisions, often not representing a real community. There is no reason why the new neighbourhood units, which are being designed by the town planners for the towns, should not have neighbourhood councils similar to the parish councils in the rural areas. They could serve a useful purpose by discussing the really local matters of each distinct neighbourhood of the town.[3]

Secondly, the whole system divorces town from country in a way that must distress a geographer who naturally regards them as complementary. This divorce takes two forms. The fact that the 83 one-tier county boroughs are quite independent of the counties means that the counties are mere remainders after the greater towns have been taken away, and are therefore largely rural in character. For the counties there remain the rural areas, the smaller towns and the suburban districts that have grown up immediately outside the boundaries of the county boroughs. Demands made by county boroughs to extend their boundaries have always been hotly contested by the counties affected because the latter fear losing their richest areas, the overspill suburban areas just outside the large towns. Empire-building by county boroughs has led to hostility between counties and county boroughs which has been most harmful. These continuous battles have been a root cause of the lack of understanding between the large towns and the rural areas.

An important social fact of our time is the existence of a great daily ebb and flow of population. Improved methods of transport enable large numbers of people to live in one area and to work in another. Great cities and also the medium-sized towns draw people whose homes are outside their boundaries to come and work in them by day. These people are provided with many

[1] 'Report of the Local Government Boundary Commission for the year 1946,' p. 8.

[2] Cmd. 6378, p. 54.

[3] Professor C. B. Fawcett, in his booklet 'A residential unit for town and country planning' (London, 1944), makes some interesting suggestions with regard to the establishment of new settlements and bases his ideas on the distance between the home and the school.

services by the city in which they work, but they probably pay rates only to the Council in whose area they sleep. Much of the apathy towards local government is due to the fact that the boundaries do not recognize this daily

Figure 21

tide of people journeying to and from work. The rigid administrative separation between county borough and county is completely out of touch with the facts of daily life and work.

Even inside the counties themselves the division into districts of different

kinds has separated town and country. Many urban and rural districts were arbitrarily drawn, and in some cases the small market town which is the geographical focus of the district is a non-county borough. The market town is thus cut off from its surrounding countryside, and town and country are again separated in this tier of local government. It has often been suggested that a new type of district is needed as the lower tier in the counties, namely a town-and-country area. Three recent examples of this kind of proposal can be given.

Mr. R. V. O. Hart-Synnot of St. John's College, Oxford, in 1947 designed a scheme by which Berkshire, Buckinghamshire and Oxfordshire were to be divided into 30 local authorities to replace the existing 53 units. His 30 town-and-country areas are therefore larger than the present units, and with towns as their centres they correspond more closely to geographical reality than do the present divisions. In some cases Mr. Hart-Synnot ignores county boundaries in order to achieve his purpose (Fig. 21). Professor G. D. H. Cole in his recent book on 'Local and regional government' (1947) has applied exactly the same principle to Norfolk and to Devon and Cornwall. He divided Norfolk into 16 "district areas" (pp. 120–1). In his opinion villages grouped round a small town make a real community with its elements in a proper relationship of mutual dependence. Professor Cole says that (p. 122) "such groupings, over the whole country, would give a greatly improved framework for the provision of efficient services and for the adequate expression of local opinions. It would convert the little Town Councils' and Urban District Councils' parish-pump politics to a sound relation to the countryside on which they depend, and would promote a much better organization of the great and expanding industry of catering for the tourist traffic."

Woodstock Borough Council prepared in 1948 a scheme by which North Oxfordshire was to be divided into "five new county districts of the town and country type" centred on Banbury, Bicester, Chipping Norton, Witney and Woodstock, thereby reducing the existing nine authorities to five (Fig. 22). The Council recommended that "the urban and rural territories to be combined should be united on the bases of geography, history and traditions, transport, educational facilities, etc.," and asserted that their scheme "would establish local government areas of reasonable size which could be administered efficiently and economically, while preserving local interests and traditions."

The work of several British geographers is relevant in this connection. Mr. A. E. Smailes has recently called attention to the importance of delimiting as exactly as possible the spheres of influence of towns as economic and social centres. His valuable and suggestive paper [1] shows that this subject is of great significance in regional geography and has much bearing on the question of administrative areas. Mr. F. H. W. Green has carried out similar work on the spheres of influence of towns in south-west England in relation to motor-bus services.

Another criticism of the present system is that it almost completely

[1] Arthur E. Smailes, "The analysis and delimitation of urban fields," *Geography*, 32 (1947) 151–61.

disregards the existence of the "conurbations"; that is, the continuous urban built-up areas of groups of towns. Dr. R. E. Dickinson has named them "urban tracts." The Boundary Commission calls some of them "concentrations of population forming a natural unit of administration." Arnold Bennett has described this type admirably in 'Whom God hath joined.' In a

Fig. 22. Proposal made by Woodstock Borough Council

description of the Five Towns of the Staffordshire Potteries at dusk he says: "all round the horizon . . . the yellow fires of furnaces grow brighter in the first oncoming of the dusk. The immense congeries of streets and squares, of little houses and great halls and manufactories, of church spires and proud smoking chimneys and chapel towers, mingle together into one wondrous organism that stretches and rolls unevenly away for miles in the grimy mists of its own endless panting." Bennett's phrase "wondrous organism" is an apt

description of the clusters of towns. These enormous agglomerations of population are economic and industrial units, and although they possess distinct geographical individuality they have no separate existence as local government units. They are needlessly divided between many authorities. Manchester is not really a city: it is a fragment of a huge urban tract. It must be admitted that the London of 1888 was boldly carved out of Middlesex, Surrey and Kent and made a separate county, but the area of the London County Council now contains only 3·1 millions of the 9 millions of Greater London. There are six great conurbations in England: London, Manchester, Birmingham, West Yorkshire, Merseyside and Tyneside, each with more than a million inhabitants and each divided among many local authorities;[1] there are others

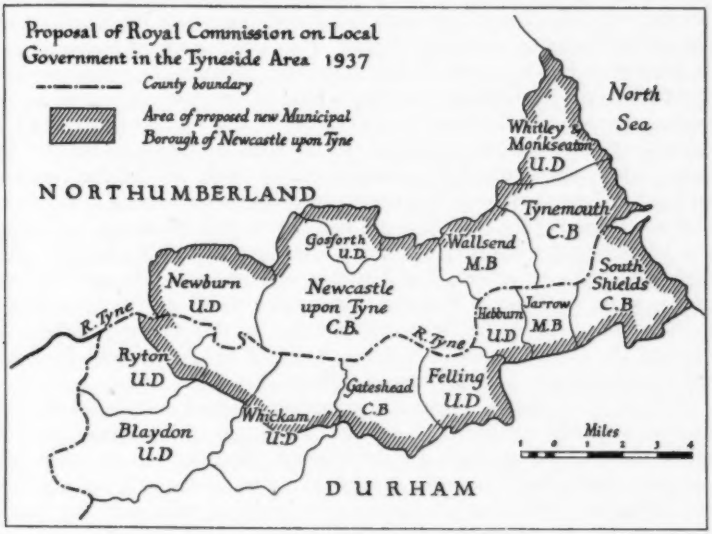


Figure 23

that are smaller, of which the Potteries (360,000) and the Brighton area in central Sussex (270,000) are not the least interesting. The Potteries are divided between three authorities and the Brighton area between five, but the existence of these two urban tracts as entities has now been recognized by the Boundary Commission.

In 1937 a majority of the Royal Commission on Local Government in the Tyneside Area[2] pronounced in favour of "the creation of a single central authority with power to administer 'regional' services over a considerable area." They also recommended the amalgamation of the areas marked on Fig. 23 as one municipal borough for minor local services. The central or

[1] Professor C. B. Fawcett calculated the size of the six great English conurbations in 1931 in thousands as follows: London, 8203; Manchester, 2427; Birmingham, 1861; West Yorkshire, 1433; Merseyside, 1287; Tyneside, 1083 (*Geogr. J.* 79 (1932) 110).

[2] Cmd. 5402.

regional authority was to include the area of the new municipal borough plus the whole county of Northumberland. The Government of the day, however, did not accept this solution of the problem, nor does the Boundary Commission.

REGIONALISM

The present system of local government wholly disregards the largest geographical units of all, the dozen or so large regions, each with a real community of spirit, which exist in this country.

During the war of 1939–45 Civil Defence Regions were set up by the central government to meet the threat of invasion (Fig. 4). The system, with its Regional Commissioners, was not popular with the local authorities, who became very suspicious of regionalism and of the miniature Whitehalls which sprang up in a dozen provincial capitals. They came to regard regionalism as an attempt to impose a new form of bureaucratic control over local government. War-time regionalism was only a form of decentralization; no democratic regional councils were established. After the war the Civil Defence regional system was soon liquidated but the areas continued to be used by several Ministries for the decentralization of their work. In 1946 the Treasury adopted as "standard" certain regions which closely correspond to the Civil Defence Regions (Fig. 5). They are used by several ministries, including the Admiralty, the Ministry of Supply and the Board of Trade, and with slight deviations by others. The Ministry of Town and Country Planning uses areas for its Regional Planning Organization which only deviate slightly in the south-east from the "standard" pattern, and this Ministry's scheme is used by the Land Commission of the Board of Agriculture and Fisheries and by that Board's Land Utilization Officers (Fig. 6).

Since 1945 a system of regional organization has been or is being adopted for several public services, including electricity, gas and hospitals, as well as for the coal industry and for the railways. The one service which has not been regionalized is water supply. Yet this service calls for regional administration, or at least for coordination, perhaps more than any other. There is still not sufficient information available about Britain's water resources. There has been no thorough national survey of water resources. There are no detailed maps of areas of supply for the country as a whole and extensive rural areas are still without an adequate supply. It must suffice to emphasize that a small country blessed with a liberal rainfall and a generous network of rivers ought not to continue to suffer from alternations of drought and flood. About four-fifths of the water undertakings are publicly owned by local authorities, but local government boundaries have been drawn without any regard to their suitability for the supply of water.[1]

First there is the regional organization for electricity supply. By 1931 the Central Electricity Board had divided Britain into seven "scheme areas" for the purposes of the grid, on the basis of the economic characteristics of each region (Fig. 7). In 1947 the Electricity Bill divided England and Wales into twelve areas for the Electricity Boards (Fig. 8) and the areas

[1] Smoke abatement is another problem which can only be solved by regional treatment.

are said to be based on "geographical, sociological, administrative and technical factors"; certainly they do cut across county boundaries. The White Paper on 'Electricity supply areas' states [1] that "Electricity supply is a service of social and economic significance and the areas for distribution of electricity should as far as possible be natural areas, with strong local outlook and interests. Many of the areas therefore have a distinctive character which has long been recognised, such as the North East Coast, East Anglia or South Wales. In almost every Area there are local industries, which will require special attention from the Area Board. Sometimes geographical features are so important technically that they influence the boundaries. The main transmission lines into Wales follow geography and run from east to west; to run them north and south over the mountainous centre of Wales would involve a great waste of capital which would hold up electricity development in areas where it is badly required. As North Wales and Merseyside have many interests in common in electricity supply, they were formed into one Area. In general it is desirable that boundaries of areas should run through lightly populated districts and thus avoid difficulties which arise when populated areas receive supplies from more than one source."

The Gas Bill of January 1948 proposes the setting up of 11 area boards in England and Wales, on the principle that each area should have as its nucleus at least one large urban and industrial district (Fig. 9). A North Thames area has been proposed for North London. No less than 269 undertakings were owned by local authorities and they sold 35·7 per cent. of the total sales of gas. There were 372 publicly owned electricity undertakings with about 60 per cent. of the total capital expended on distribution. In the cases of both gas and electricity, nationalization means regionalization and regionalization has involved loss of control by the existing local authorities. The gas industry consists of many small local undertakings. Unlike coal, gas is not a national problem; nor is it divided, as electricity is, between the production of power and its retail distribution. The Gas Bill recognizes this fact and grants more regional independence than in any of the other nationalization measures. Each of the area boards is given the duty of developing and maintaining an "efficient coordinated and economical system of gas supply" and of securing "the efficient and economic production of coke" in conjunction with the National Coal Board.

For completeness it is as well to notice that both the coal industry and the railways were regionalized when they were nationalized. The coal industry was nationalized on 1 January 1947 and a National Coal Board of nine members was set up in London. But at the same time eight "divisions" were set up, including the Scottish; these approximated to coalfields although in some cases boundaries run across coalfields (Fig. 10). Lord Hyndley is reported [2] to have said that "the Board well knows that coal is not got in Berkeley Square and it is determined to preserve as much of the autonomy of the coalfields as is consistent with national ownership and direction; but this will clearly be less than characterized the organisation of the 800 independent concerns which it has replaced."

[1] Cmd. 7007, p. 2.
[2] *The Times*, 23 October 1947.

In January 1948 the nationalized British Railways were regionalized in a scheme of six regions (Fig. 11) which are similar to those used by the old companies. London became the headquarters of four of the regions of British Railways, York of the North-Eastern region and Glasgow of the Scottish. But this was only the first stage and Sir Cyril Hurcomb, Chairman of the Transport Commission, has announced that there will be a great deal of adjustment between the boundaries of regions and in transferring the interpenetrating lines which at present exist in outlying sections of rail. He gave as examples part of the L.M.S. in South Wales round Swansea and a section of the L.N.E.R. near Chester, and he did not think the Commission would leave the two lines into the West Country overlapping and crossing at Exeter.[1]

More important, from the point of view of local government, has been the regionalization of hospitals. Fourteen areas were delineated as Regional Hospital Areas under Regional Hospital Boards in 1946. Thus another function is being taken away from the local authorities. This is a very considerable change; London County Council is said to be the largest hospital authority in the world. Each region had to be delimited in such a way as to enable the provision of hospital services to be associated conveniently with a university having a school of medicine. The resultant regions could be criticized unfavourably on geographical grounds (Fig. 16). The provisional list of areas was sent by the Minister of Health to local authorities and to various bodies for comment, including the Federation of British Industries and the Trades Union Congress; the list was not sent for comment, so far as I am aware, to the Royal Geographical Society. This is not surprising in view of the fact that the document contained no map and no estimates of population, no geographical dimensions and no account of the hospital resources of the proposed regions. The great Hospital Surveys, described as the Domesday Book of the hospital services, published by the Ministry of Health in ten blue books in 1945, give most of this information but they contain very few maps. These are entirely lacking from some volumes, and in some cases they are very crudely drawn.

It is obvious that the construction of "catchment" areas for hospitals, that is of "natural hospital regions," a phrase used by *The Times*,[2] is a geographical problem closely connected with Professor E. G. R. Taylor's "regions of circulation," and it is most regrettable that geographers were not consulted in the designing of hospital regions and areas. But it is far more regrettable that local government areas were not reformed before the hospitals were regionalized. Had that been the case, it might not have been necessary to take them out of the control of the local government authorities.

The blue book on 'The hospital services of the Sheffield and East Midlands area' (1945) contains the most geographical treatment in the ten hospital reports, and includes an interesting map of hospital areas (sub-divisions) based on "natural groups of population." In this survey it is stated (pp. 75, 76) that the arbitrarily drawn local government boundaries "completely cut across the natural flow of patients to the hospital centre," and that all new schemes should be prepared "in terms of natural population units." The report goes

[1] *The Times*, 27 November 1947.
[2] *Ibid.*, 5 December 1946.

on to say that (p. 76) "we cannot in future allow such wasteful duplication as the erection of two sanatoria within five miles of each other, as in Nottinghamshire, because of a line drawn on a map—the boundary of the County Borough of Nottingham—or the similar waste in Leicestershire, where two isolation hospitals and sanatoria have been erected within the last ten years less than five miles apart." The report (p. 89) cites Derbyshire as "one of the best examples of the unsuitability of local government boundaries for the definition of hospital areas."

The Town and Country Planning Act of 1947 made the counties and the county boroughs the sole local planning authorities, but the Minister was given power to establish joint boards for the areas of two or more councils or for any part of those areas and to make such joint boards the local planning authority. There is therefore a possibility that joint boards may become the planning authorities for large regions.

Thus it will be seen that in many ways the central government has regionalized its administration in England and Wales, but it has not yet proposed to set up democratically elected councils for the regions. If regional areas for local government were well chosen, the people would probably feel that most of the regions possessed more community of spirit than many of the existing units.

Geographers have asserted for years past that provinces, each with regional consciousness, do exist in England and Wales. Professor C. B. Fawcett's pioneer work [1] of 1917 appeared only seven years after Vidal de la Blache had produced a similar regional scheme for the administrative division of France. Professor Fawcett produced a revised map with 12 regions in 1942 (Fig. 12), and in the same year Professor E. G. R. Taylor published a scheme of 16 planning regions based on geographical considerations (Fig. 13). The author of this paper contributed a map of 15 regions, made up largely of groups of existing counties, in 1941 (Fig. 14). Professor G. D. H. Cole produced a scheme of 19 proposed planning regions in his book 'Local and regional government' in 1947; five of these regions are conurbations (Fig. 15). Professor Cole proposes that regional planning authorities with councils—not joint boards—be established for each region.

It is well known that there is general hostility amongst existing local authorities to the idea of regionalism in local government. The White Paper of 1945 [2] stated that the (Coalition) Government did not believe "that a solution is to be found in the creation of regional authorities," and added that the Local Government Associations had been unanimous in their antagonism to such authorities. Nevertheless it cannot be denied that regional consciousness does exist in several parts of the country, and that it is growing. There is a latent sense of unity in East Anglia, in the South-West, in the North-East, in the West Midlands, in the East Midlands, in Lancashire and in Yorkshire, as well as in London. Yorkshire and Lancashire are regions rather than counties when regarded in this way. The existence of this

[1] C. B. Fawcett, "Natural divisions of England," *Geogr. J.* 49 (1917) 124–41.

[2] 'Local Government in England and Wales during the period of reconstruction,' p. 6. Cmd. 6579.

feeling of regional community was clearly proved in July 1946, when it was announced in a White Paper on 'Broadcasting policy' [1] that the Government proposed to amalgamate the West region of the B.B.C. with the Midland region. Many West Country members of Parliament from all parties attacked the proposal vigorously in the House of Commons. One member said that "the proposal would cause hardship to West Country listeners through the depreciation of the quality of reception, the curtailment of time devoted to items of local interest, and a reduction in news and discussions on farming topics, with consequent loss of food production." Another member stated that "if these iniquitous proceedings go on, then 20,000 Cornishmen will know the reason why, supported by at least as many Devonians." A deputation of West Country Labour M.P.s visited Mr. Morrison and it was said that "a separate region was necessary in order to preserve the special cultural, civic, agricultural, and religious characteristics of the West Country." In view of the strength of feeling aroused by the proposal the Government gave way in August 1946 and agreed to continue the West of England region as a separate entity.

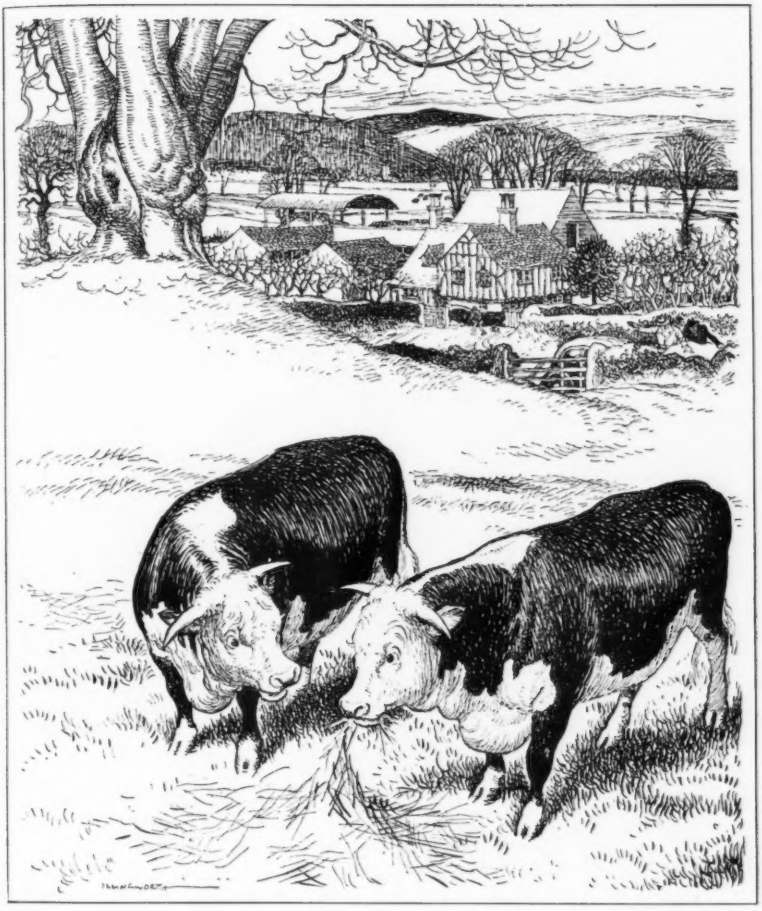
Between the two wars the B.B.C. was the main means by which England rediscovered its lost regional feeling. The regional divisions of the B.B.C. were not made with any desire to encourage provincialism but purely for technical reasons. The regional broadcasting studios have been described as "the Athenaea of a revived local life."

Regional names are often incorrectly used and the term "Midlands" is sometimes applied quite recklessly. A map of the normal regional divisions used by the Meteorological Office of the Air Ministry was recently published in the *Radio Times*; on it the whole of the West Riding as well as Derbyshire is enclosed in an area called "Midlands N." (Fig. 17.)

PROPOSALS OF THE BOUNDARY COMMISSION

A White Paper, published in January 1945, entitled 'Local Government in England and Wales during the period of reconstruction,' proposed that a Local Government Boundary Commission should be set up and this was done by Act of Parliament later in the same year. The White Paper, a very cautious document, stated that (p. 4) "the time is not opportune for a general recasting of the local government structure." The Commission were given certain limited powers and the regulations of the Minister of Health required them to have as "the object of all alterations in status of local government authorities, and of all alterations in the boundaries of local government areas" the provision of "individually and collectively effective and convenient units of local government administration." In order to attain this object the Commission were asked to consider the following main factors which were listed, somewhat oddly, in alphabetical order: "(*a*) community of interest; (*b*) development, or anticipated development; (*c*) economic and industrial characteristics; (*d*) financial resources; (*e*) physical features, including in particular, but not exclusively, suitable boundaries, means of communication, and accessibility to administrative centres and centres of

[1] Cmd. 6852.



THE CATTLE CRISIS

"Are *we* to become Worcesters?"

[The Local Boundary Commission has proposed the merging of a large part of Herefordshire in Worcestershire]

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business and social life; (*f*) population—size, distribution and characteristics; (*g*) record of administration by local authorities concerned; (*h*) size and shape of the area; (*i*) wishes of the inhabitants." The alphabetical order places the wishes of the people last. The Commission's powers were not to apply to London and Middlesex.

In 1947 the Local Government Boundary Commission brought out their first report for the year 1946, and although they have made a number of decisions they have not yet made any orders. In March 1948 the Commission's second report, for the year 1947, was published.[1] The Commission then stated that they could not properly recast local government under their existing terms of references; they had no authority to redistribute functions between the different authorities. The Commission stated very clearly that without a considerable extension of their powers they could not perform their allotted task of creating "effective and convenient units of local government administration." The report then sets out in detail a plan of reorganization which would be carried out if the Commission were given more power.

This document is of intense interest to any geographer but, as it is not illustrated by a single map, it is very difficult to follow without a detailed administrative atlas.[2] The Commission lay very great emphasis on size of population, and state that 200,000 is the minimum figure for a major local government unit. They lay down four main principles (pp. 20–21):

"(*a*) In future there should be three main types of local government units—counties, county boroughs, and county districts. To distinguish the first two from existing units we refer to them in this Report as 'new counties' and 'new county boroughs.' "

"(*b*) The whole of England and Wales, *including* the areas of the existing county boroughs, would be divided into new counties. The bulk of these would be the existing counties, with some combined and some divided; and they would be administered, as now, on the two-tier system. The remainder of the new counties would be [twenty] large cities and towns (with suitable alterations of boundaries where necessary) administered, as now, on the one-tier system. The general aim would be to secure a population in each new two-tier county between 200,000 and 1,000,000 and in each one-tier county of between 200,000 and 500,000."

It follows that existing counties with more than a million inhabitants should be divided and counties with less than 200,000 should be united. The Commissioners state (p. 26) that they have departed "from the lower limit where geography or distances make a larger unit impracticable and from the higher limit where the population is highly concentrated."

"(*c*) The new county boroughs would consist broadly of the middle-size towns—boroughs with populations between 60,000 and 200,000. They would also include the Cities of Liverpool and Manchester which would form the

[1] 'Report of the Local Government Boundary Commission for the year 1947,' 11 March 1948.

[2] The two maps of Administrative Areas (1944), scale 1/625,000, compiled by the Ministry of Town and Country Planning and the Ordnance Survey, are essential for the understanding of the Report.

centres of two new counties. The new county boroughs would be part of the administrative county and would look to the county for certain services (including police and fire). But they would form a new and middle rank of authority with important autonomous functions—in particular, all education, health, and care of the old and disabled services, and parts of town and country planning and highways—in addition to all those of an ordinary second-tier authority."

Figure 24

"(*d*) County districts would include all non-county boroughs, urban districts and rural districts. . . . The distinction in title between Urban and Rural Districts would be abolished, and all county districts would, after their boundaries had been reviewed, have similar autonomous functions."

To understand what these proposals actually involve, many maps are needed. The maps reproduced with this paper only give a very general picture of the Commission's intentions. Many questions are still undecided, and as the accompanying maps have been made as simple as possible, they must not be regarded as absolutely accurate in detail.

Counties requiring division (Figs. 24 and 25).—Lancashire is divided into five counties. North Lancashire is united with Westmorland as one county. The remainder of Lancashire with some parts of North-East Cheshire and the Wirral is divided into four new counties, within which all existing county boroughs, including Liverpool and Manchester, but with the possible exception of Bury, become new county boroughs. Lancaster South was selected as a county because (p. 53) it is "an area which has a reasonably balanced industrial economy and is not entirely dependent on 'Cotton'." Two of the counties are virtually conurbations: Lancaster South-West is Merseyside with 1·4 million persons; Lancaster South-East is the huge community round Manchester, including 1,069,000 in Manchester, Salford, Stockport and Stretford combined. The exact figure of the population of Lancaster South-East is not known because the county's southern boundary is undecided. It should be noticed that in both Lancaster South-West and Lancaster South-East the Commission are breaking their own rule that a two-tier county should have a population not exceeding one million.

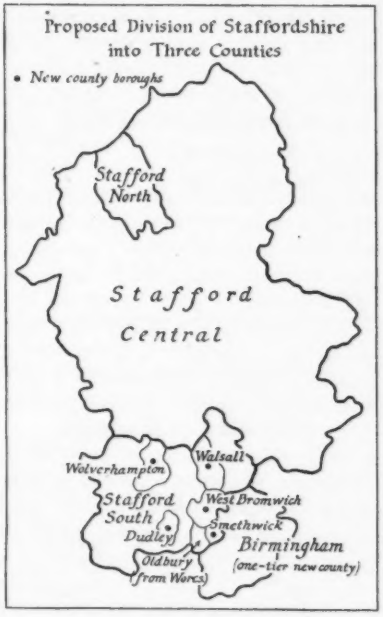


Figure 25

Cheshire is divided by the rearrangement in Lancashire.

Yorkshire with the north bank of the Tees is divided into eight new counties: North, South, East and West as two-tier new counties, while Bradford, Kingston-upon-Hull, Leeds and Sheffield become one-tier counties. By the inclusion of the north bank of the Tees, Yorkshire's bounds are set "wider still and wider." Previously the usual proposal has been to add the south bank of the Tees to the county of Durham. A South Riding is carved out of the existing West Riding and its economy is essentially concerned with the Yorkshire coalfield; it is probable that the capital would be either Barnsley or Doncaster.

Staffordshire is divided into three parts corresponding to the Potteries, the Black Country and the agricultural central area. The Potteries are to be a one-tier new county and the other two parts become two-tier new counties.

Counties requiring union (Figs. 26 and 27).—In addition to the proposed union of Westmorland with North Lancashire and of parts of Cheshire with Lancashire the following unions are recommended (population in thousands in brackets):

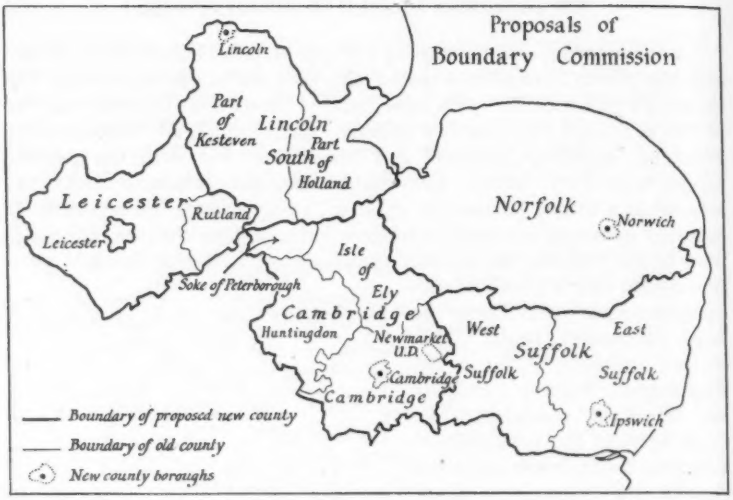


Figure 26

Figure 27

	Total Population
Leicester (332) and Rutland (18)	350,000
Lincoln (Parts of Holland) (100) and Lincoln (Parts of Kesteven) (117) and Lincoln City (66)	283,000
East (203) and West Suffolk (100) and Ipswich (101)	404,000
Cambridgeshire (160), Isle of Ely (85), Huntingdon (62), and Soke of Peterborough (61), and part of Suffolk	375,000
Hereford (121) and Worcester (389)	510,000

It is stated that the smaller of these counties cannot in future be "effective" units of county local government. If Holland had been united with the Cambridge group, the resulting area would have approximated closely to the Fenland. It is proposed that the present County of Lincoln (Parts of Lindsey), with Grimsby as a new county borough, should become the new County of Lincoln North; its population would be 384,000.

The Commission spare the Isle of Wight in these words (p. 33): "The Isle of Wight with a population of 92,000 is far below the desirable population minimum, but it is an island and cannot conveniently be united with the mainland. We therefore recommend no change." Although the Commission have not finally made up their minds about Wales, they appear to have decided that Anglesey (48,000) should be united with Caernarvon. The report reads (p. 40): "We do not forget that Anglesey is an island and in consequence has not the same common interest with its neighbour Caernarvon as it might have were it on the mainland. But we are not at present satisfied that, because it is an island, it ought to continue as a separate administrative county."

Concentrations suitable to become separate one-tier new counties.—Twenty such concentrations are described as forming "natural units of administration" and "large enough to justify" their being made into separate counties (Fig. 28). These include two smaller conurbations: the Potteries, which becomes the county of Stafford North (360,000), and the Brighton and Hove area, which becomes the county of Sussex Central (270,000).

It is not possible to discuss the selection of 63 towns in the Commission's list of new county boroughs, but the 10 non-county boroughs to be promoted to this rank are Cambridge, Cheltenham, Chesterfield, Luton, Poole, Slough, Stockton-on-Tees, Stretford, Swindon and Worthing. The investigations are by no means complete but it does appear to be certain that Canterbury, with a population of 25,000, has been ruled out of the list of new county boroughs and will be demoted to the status of a non-county borough.

The Commission make four alternative proposals for re-grouping the counties of Wales in order to produce larger units (Fig. 29). In each alternative Cardiff becomes a one-tier new county and Glamorgan a two-tier new county with Merthyr Tydfil as a new county borough within that county. The future position of Swansea is not yet settled. Of the four alternatives for the remaining counties, proposal 3 fits in best with the historical divisions of Wales. North-West Wales corresponds to ancient Gwynedd and to the modern Anglican diocese of Bangor. Denbigh and Flint corresponds to the

diocese of St. Asaph. The new county of Brecknock, Montgomery and Radnor (with Llandrindod Wells as its capital) is similar in area to ancient Powys and is roughly like the diocese of Swansea and Brecon, while the extent of the new county of Cardigan, Carmarthen and Pembroke corresponds to

Figure 28

ancient Dyfed and to the diocese of St. Davids. The alternatives are of great interest to any student of the geography of Wales.

The net result of the proposals of the Commission for England alone is that the existing 49 administrative counties (excluding London) are replaced by 67 new counties, 20 of which are one-tier. The existing 80 county boroughs are replaced by 63 new county boroughs, each with two-tier government. In all 129 authorities are replaced by 130.

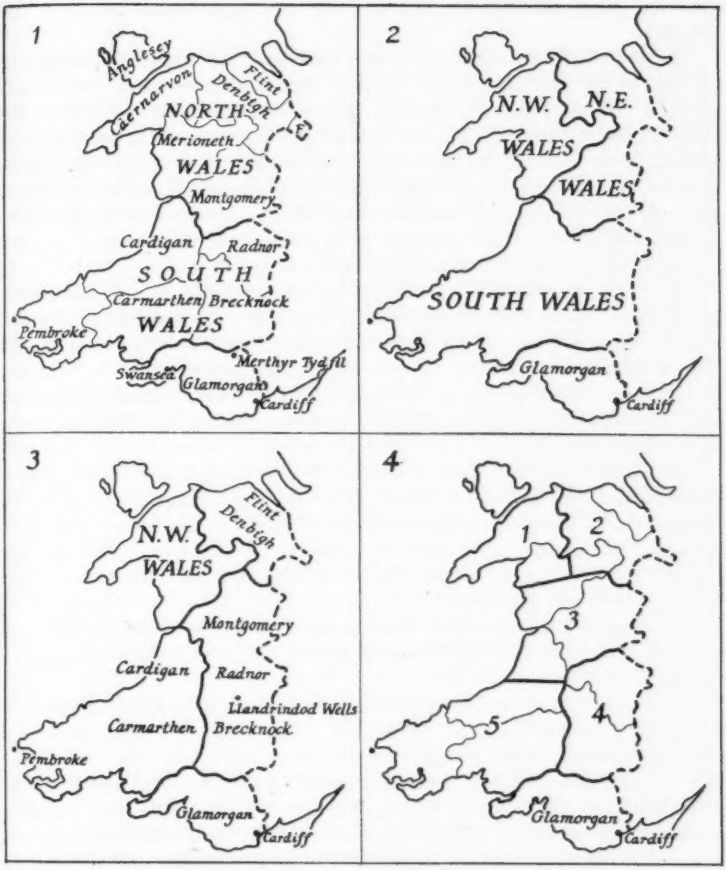


Fig. 29. Boundary Commission's alternative proposals for Wales

GEOGRAPHICAL CRITICISMS OF THE COMMISSION'S PROPOSALS

In what ways do the Boundary Commission meet the geographical criticisms outlined earlier in this paper?

Parishes.—In their first report the Commission emphasized the value of the parochial organization (p. 16) and suggested that a similar system might be introduced into urban areas in connection with the new conception of neighbourhood units; and they stress these points again in their second report (pp. 41–2).

Divorce of town from country.—It is clear from the report that the Commission would make amalgamations and alterations of the boundaries of County Districts if the functions of these areas were similar. They might

produce town-with-country districts for the more rural parts of the country.

The union of new county boroughs with the new counties is a definite attempt to integrate town with country. But this well-meaning effort will probably be opposed. The smaller county boroughs claim that they are compact social units which merit one-tier government, and argue that substantial advantages may be lost under the proposed new system. The council of the County Borough of Stockport has already passed a resolution "that a far more detailed enquiry should be made into the relative merits and democratic content of 'one' and 'two-tier' local government before major changes are undertaken in the structure of local government." [1]

The Commission could have attempted to recast the counties altogether and thus produced a set of areas like the 46 telephone areas designed by the Post Office, which are sub-divisions of the seven Post Office regions (Fig. 18). The 46 telephone areas (Fig. 19) or the 59 regions produced by the Ministry of Health in 1920 (Fig. 20) can be regarded as possible scientific alternatives to the present county system. But to take such a drastic step would certainly be regarded as far too severe a break with tradition.

The Commission have been criticized for their proposals to unite existing counties, and arguments from county cricket have been brought forward in the discussions. It is worth remembering that Sir Pelham Warner is reported to have said in February 1942 that "he could see nothing wrong with modern cricket except that there were too many counties, and that some wickets were over-prepared and over-doped."

The proposed union of Herefordshire and Worcestershire has received severe criticism and *Punch* (28 January 1948) devoted a full page to the subject (facing p. 184).

It is right to quote the Commission's defence of the unions of counties which they propose (p. 14): "We have been asked what effect an Order might have on the name of a geographical county, on county institutions, on diocesan and other religious organizations, and on all the social, sporting and other activities—for example, qualification for a county cricket team—usually associated with a county. The short answer is 'None at all.' We are concerned with administrative counties as units of local government administration. We have no power—and certainly no desire—to alter either the boundaries or the name of any geographical county, and its name will remain in the Atlas exactly as it does to-day.

"Parliament has charged us with the duty of securing units of local government which are both effective and convenient. In the case of a county this involves the selection of an administrative area suitable—which means convenient as well as effective—for a county council. In Yorkshire it has been found proper for many centuries to have more than one such area for local administration, but for matters outside local government and to the world at large all its inhabitants are Yorkshiremen. In the reverse case of the union of two counties for local government, the traditions, culture and characteristics of each county will remain unaltered, even though, as often is the case now for

[1] See also 'Local government reform—two tiers or one?'(1948), a declaration adopted by representatives of seventeen county boroughs in Lancashire and Cheshire.

some local government services, they may work together for all services on one body."

Here the Commission are making a mistake in their argument. I am sure that Professor Fawcett who, like myself, is an exiled northerner, will agree with me that Yorkshire is a province, a region, and not a mere county. It is therefore not a suitable case for this particular argument. Yorkshire's pride is well illustrated in Winifred Holtby's classic regional novel 'South Riding,' in which the farmer hero Robert Carne is said to worship "the creator of earth and heaven, the Lord of Harvest, the Ancient of Days and Seasons, who had in his beneficent providence ordained that Yorkshire should be the greatest county in England, which was the grandest country in the world, the motherland of the widest Empire, the undoubted moral leader of civilisation, the mistress of the globe." The mere number of its county councils will not affect and will certainly not destroy the spirit of such a county which is, in fact, a region. Whether the absence of a separate county council will damage the county feeling of Herefordshire is an entirely different question: Hereford is not a province. If counties generally are retained the case for depriving Herefordshire of its county council rests on the rather slender arithmetical ground that it has only 121,000 inhabitants and not 200,000. It is a large compact area of 550 square miles (Fig. 27) and was rightly described by the West Midland Group [1] as "an agricultural county which is more or less a separate entity."

Conurbations.—Here the Commission have been rather timid. Admittedly they propose to create new counties round Manchester and Merseyside, while the three local authorities which make up the Potteries (Fig. 30) and the five or possibly six which make the conurbation of Brighton are to be united as new counties (Fig. 31). But the Commission have rejected the idea that Birmingham should be united with the Black Country, merely on statistical grounds of population: there would be over two million people in the joint area.[2] Again, the Commission do not propose to unite both banks of the Tyne (as was proposed by the Royal Commission of 1937), because in its view (p. 51) "the population of Tyneside (about 850,000) is both too great and too widespread to justify a single one-tier unit." On the other hand the Commission propose to unite both banks of the Tees and to transfer Stockton-on-Tees and Billingham urban district from the present county of Durham into the new county of York North. This unfortunate proposal would divide the southern half of the Development Area of 1946 between the two counties; it would have been better to place the whole area (including Middlesbrough) in the county of Durham.

The Commission do not propose to create any counties in Yorkshire similar to those proposed round Liverpool and Manchester. It is sad but true that in Yorkshire the conurbations will not "conurbate" when it is a question of local government. It is worth quoting Professor C. B. Fawcett's account of the West Yorkshire conurbation in this connection. "The West

[1] 'English county: a planning survey of Herefordshire,' p. 7, London 1946.

[2] The West Midland Group contemplate the creation of four or five great one-tier county boroughs to replace the existing councils in the conurbation of Birmingham and the Black Country: 'Conurbation,' pp. 47–65, London, 1948.

Yorkshire conurbation," he writes, "has neither a central focus of routes determined by geographical conditions nor any one dominant city; hence it has no corresponding tradition of unity, and the realization of its actual unity is not yet widespread, either among its own people or beyond its limits." [1] The Commission have ruled that Leeds and Bradford "are independent of

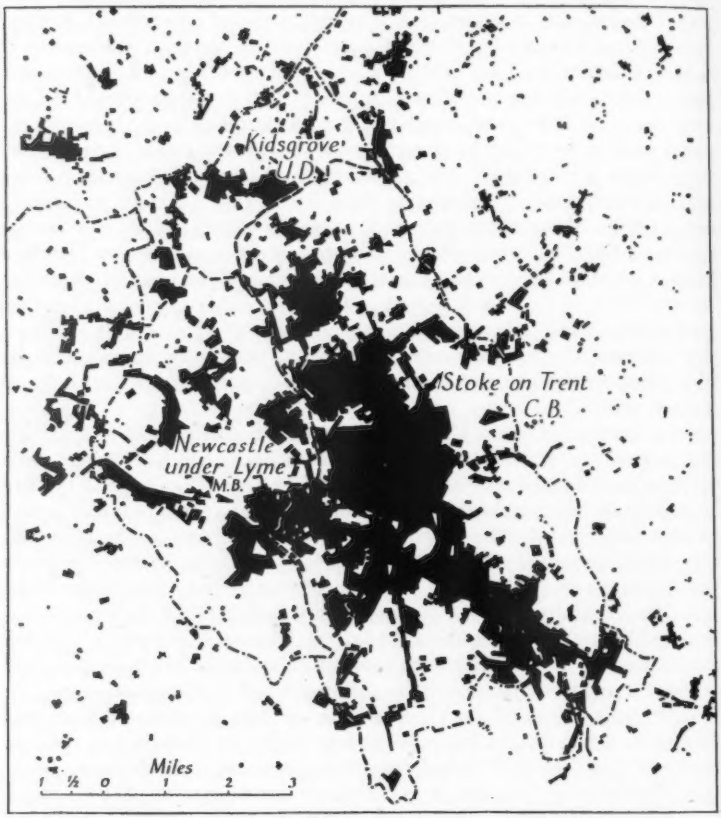


Fig. 30. Proposed new county of North Stafford (the Potteries). Figs. 30–33 are based on the sheets of the Land Utilisation Survey of Britain. The parts of the map that are coloured red ("land agriculturally unproductive") and mauve ("gardens, etc.") have both been marked black, generalized and reduced

each other and should remain separate for local government, at least so long as they remain physically separate " (p. 59).

The Commission do not propose to unite Sheffield (512,000) with Rotherham (81,000), although that borough "is physically joined to Sheffield." Again

[1] *Geogr. J.* 79 (1932) 105.

they seem to be afraid of exceeding their figure of 500,000 although they "realize that the existing boundary between Rotherham and Sheffield is not a good county boundary" (p. 59).

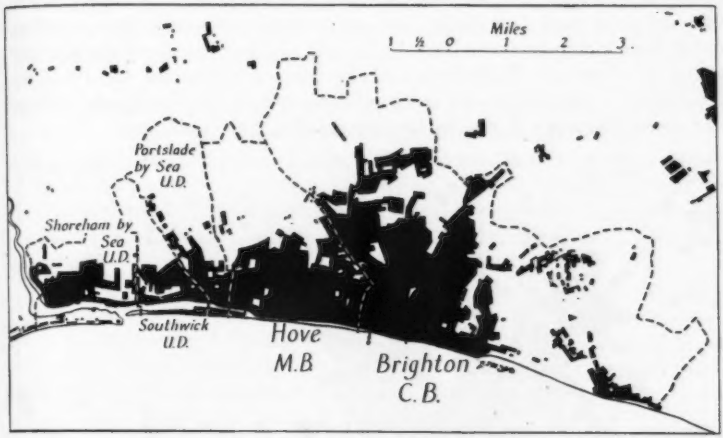


Fig. 31. Proposed new county of Central Sussex

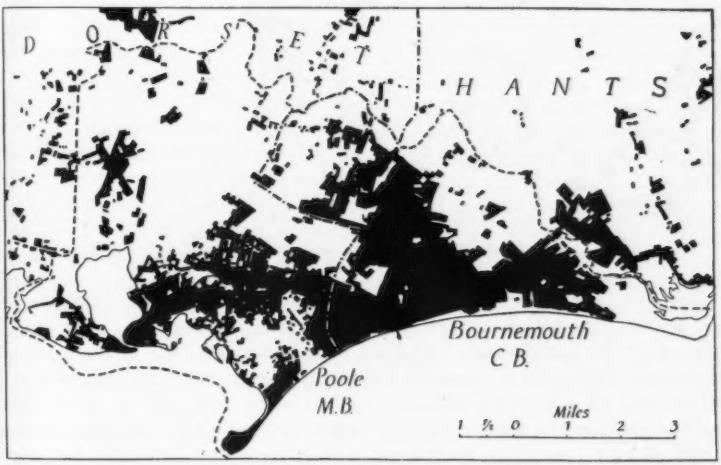


Fig. 32. Bournemouth and Poole

In the case of Merseyside the Commission state that (pp. 54–5) "when a concentration of 1,400,000 persons in an area of this type have so many common interests in life, in business and in local government, they should, through their representatives, study and decide their wider problems in the common meeting ground of one county council." If those principles are

valid in the case of Merseyside, they are equally valid in the case of the other conurbations.

On a smaller scale, the Commission do not propose to amalgamate Bournemouth with Poole in a new one-tier county for fear of weakening Dorset; both are to be made new county boroughs, and Bournemouth is to be transferred from Hampshire into Dorset (Fig. 32). On the other hand the Medway towns of Chatham, Gillingham and Rochester, recognized by Professor Fawcett as a conurbation, are to be amalgamated by the Commission in one new county borough of 144,000 inhabitants (Fig. 33).

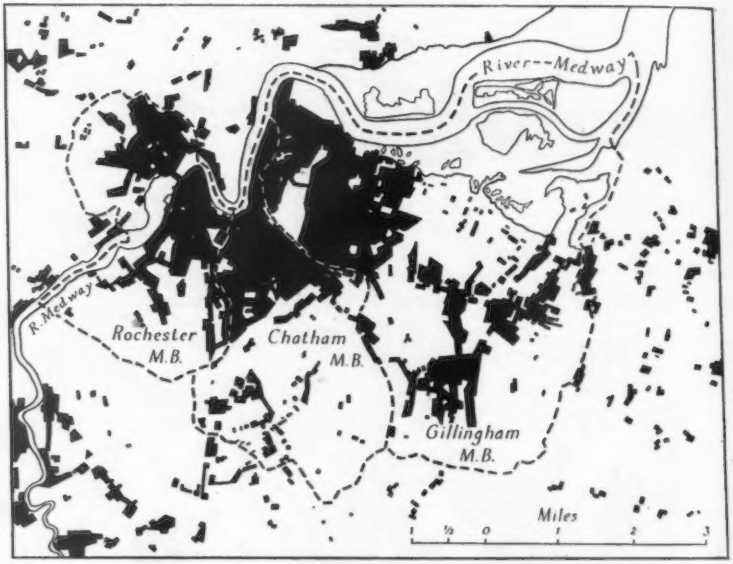


Fig. 33. Proposed new county borough of the Medway Towns

Regions.—The Commission do not mention the subject of regionalism and are therefore not necessarily opposed to regional organization. A form of regionalism for coordination could easily be imposed on the Commission's framework. Some sort of proposals for coordinating certain functions of local government on a regional scale are badly needed, especially in town and country planning, in the provision of water and in sewage disposal. Many functions have been taken away from local government authorities because their areas have been regarded as too small. The hospitals were nationalized and taken from the local authorities because they were to be regionalized. If regional councils were formed, there would be a practicable alternative to the continued transfer of functions from local authorities to central departments or to specially created bodies. Unless regional councils are boldly created, the mistake made in the nineteenth century of setting up large numbers of separate bodies for each service, like boards of guardians, highway

boards and so on, will be repeated on a grander scale. The same error has already been made in the government of London with its numerous authorities for police, transport, the port and other functions.

Again, the increasing centralization of government in London has weakened the local authorities themselves. The Commission themselves say that (p. 5) "the increased central control of local administration, if carried much further, will cut at the root of local government." The creation of a new provincial heptarchy could stop this process by which the local authorities in every tier are being overshadowed by the central government. Rules devised in London, which is after all merely a very large conurbation in the south-eastern corner of England, may not of necessity be suitable for the whole country, particularly for that part of it which lies north of the Trent. There is a real danger of the whole island becoming a suburb of London as France was once said to be of Paris.

Sir Warren Fisher, formerly head of the Civil Service, put the matter very clearly in a speech at Manchester in October 1944. Speaking of the overshadowing of local government by Westminster and central government he said: "The only hope for the provinces to retain any real measure of independence was the enlargement of the local unit of administration. Great Britain subdivided herself naturally into a heptarchy—Scotland, Wales, the six northern counties of England, East Anglia, the South-West, the Midlands, and the Home Counties. Under this organization the county councils and county borough councils would continue to function but would also be the electoral colleges for the heptarchic sub-Parliaments which would be unifying and policy-inspiring authorities. Westminster would be relieved of a lot of detail which wastes its time and impedes its proper function of dealing with fundamental principles; and at the same time the central government would be discouraged from its growing high-headedness by the existence of these seven powerful bodies which would be able to hold the ring for local government that historically has been one of our sheet-anchors."

Areas of local government should correspond to those in which people live and conduct their social and economic affairs. This argument applies just as strongly in the case of regions as in the case of districts and parishes. Regional systems are now used both by the central government and by voluntary organizations of many kinds. There is a strong case for establishing regional unions of counties for certain purposes of local administration, if only because the councils of these large areas might be able to resist bureaucratic encroachment from the centre more effectively than the existing authorities.

What is to be done now? There are some who say that the powers of the Boundary Commission should be extended on the lines proposed in their report. There are others who argue, and with some reason, that a Royal Commission should be set up to investigate the whole problem of local government. But the matter is very urgent, and the latter course might mean far too long delay before anything at all is done. If the Boundary Commission are granted the powers for which they ask, it would still be possible for a separate inquiry or for a Royal Commission to examine the question of regional councils.

The work of geographers is very relevant to the whole issue of local government. Nevertheless geographers do not claim to be able to produce ready-made solutions unaided; they are well aware that environment is only *one* of the factors on which human relationships depend. Most geographers will agree that many of the problems concerning areas for local government cannot be answered in the present state of our knowledge, and that what is needed is more research and more work on social geography in the proper meaning of that much misused term.

Two objects should always be in the minds of any reformers. Areas should be large enough for efficiency and large enough to be able to stand up to the central government, but at the same time local sentiment and the feeling of neighbourhood should be preserved at all costs. Whatever is or is not done, it is vital that the administrative map of England and Wales should be redrawn so that it accords with the social geography of the country.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: The subject of "The boundaries of local government areas" is one which concerns everybody in this country most closely, and I hope the discussion will cover as wide a field as possible.

Mr. Gilbert then read the paper printed above, and a discussion followed.

The PRESIDENT: Since, to my regret, I shall not be able to remain to the end of what I feel sure will be a most interesting discussion on Mr. Gilbert's paper, I would like at this stage to make some comments instead of, as is usual, at the close.

The first point that must have impressed this audience is the Boundary Commission's disregard for its own terms of reference and rules. Further criticism of its findings need scarcely be made by me, since they have been made far more effectively by Mr. Gilbert. But I cannot leave the subject entirely alone and I must add that a series of recommendations published in a White Paper containing no map, or even any true consideration of the geographical features involved by those recommendations, is in itself such severe condemnation of the Commission's findings as virtually to need no other. It is not that other White Papers do not contain maps. I need only draw your attention to the White Paper which contained the findings of the New Forest Commission, where two admirable maps were enclosed. A series of maps of the same sort, even in outline form, is the least that the Boundary Commission should have had the courtesy to supply to the British public.

Mr. Gilbert is not entirely correct in saying that there is no regionalism involved in the amalgamation of Herefordshire and Worcestershire in one administrative unit. There is a substantial element of regionalism in the three counties of Herefordshire, Worcestershire and Gloucestershire, a regionalism of very respectable antiquity and of great practical value to-day. The principal objection to the recommendations which have been made springs in this instance not from hostility or rivalry between the two counties, the relations of which with each other are quite admirable, and a model of what neighbourly relations ought to be. Nevertheless the opposition is practically universal, so far as I know, in both counties, where the wishes of the inhabitants were not ascertained by the Boundary Commission, though required to do so in their own view before the recommendations were published. The real objection to

the administrative union of the two counties resides in its inconvenience owing to certain geographical features to which I have referred in the public press but which appear to have been disregarded in making the recommendations.

Mr. Gilbert's lecture had a background of what might be called regionalism. Perhaps, as a lead to the discussion, the subject of regionalism in local government might be usefully pursued, more especially on account of the contributions to that particular subject made by Professor Taylor and Professor Fawcett, both of whom are here. I will first call on Professor Taylor to speak.

Professor E. G. R. TAYLOR: It is usual for the first speaker to congratulate the lecturer, and particularly I should like to thank Mr. Gilbert for the enormous care and the amount of trouble he must have spent in supplying the deficiency of maps to illustrate the findings of the Boundary Commission.

The particular point to which I wish to limit myself I will term in one word—accessibility, as one of the bases for the redrawing of regions or boundaries. To take one point of accessibility which is relevant to the Herefordshire–Worcestershire matter, it is probably true to say that those who deal with these things are people of a certain class, a certain education and a certain type. Yet if government is to be democratic the centres of government, whether major or lesser centres, must be accessible in terms of the ordinary man or woman who may be placed on council or committee. You will hear it said—it is almost an axiom—that distance has been abolished now, and consequently there is no question of accessibility; or that everybody now has a motor-car so again there is no question of accessibility. Of course you know that "everybody" means "everybody in my class or above it," or "everybody in my income group and above it." So that in deciding upon centres of administration, here is a point which must be borne in mind.

Such accessibility must be in terms, obviously, of means of transport; obviously also in terms of time and in terms of expense. Both as regards the centres of administration and the boundaries of the administrative units—I am now expanding my idea of accessibility—we have to consider that the grouping of the population into a community in relation to, say, hospital areas rests on this physical matter of being able to get together; so that we come back again to the question of means of transport, expense of transport, and time—not only the time taken in transport, but availability of transport at the convenient time. A person in a job may get a half-day off to attend a committee meeting, but that individual cannot attend if it takes all day to get to it by 'bus or train. For instance, to get from one part of Berkshire to another is a day's journey. There must be accessibility measured in terms of the total factors involved.

That brings me to a constructive point. In attempting to reconcile all the difficult considerations brought together in respect of the question of administrative units there should be two fundamental maps in front of those who are engaged in the job. The first of these maps exists, and I was sorry Mr. Gilbert could not show it, but being coloured it is difficult to display as a slide; that is the admirable map made by the Ministry of Town and Country Planning Maps Department which shows all the existing administrative divisions of England and Wales. The second map which is needed is one on the lines of the experimental maps Mr. Gilbert has shown of the areas of town–country relationship, and of the areas within which the journey to work is a tidal relationship; these depend upon the availability of means of access in the terms I have already defined. We could construct such a map without difficulty provided we had the assistants to do the rather laborious work and the money to pay them to do it, neither of which is forthcoming. There is no technical difficulty in constructing a map of the practical limits of access all over the country, from the

country to the little town, to the larger town and so on. I have exhibited specimens of such maps in this Hall showing two-way accessibility in business hours to larger business centres. To these must be added maps showing accessibility in shopping hours, of concern to the housewife; also social accessibility after work hours, a pointer to the social group. Such an accessibility map, set up on the same scale and by uniform techniques, should be placed side by side with the map of existing boundaries and proposed boundaries. Then at least there would be a test as to whether in fact the people within the proposed boundary are a potential group or social unit and whether the centre proposed for administration is one accessible to the poor as well as the rich man.

I will not detain you by detailing my experience when I tried to bring maps of these types to the attention of a group seriously discussing boundaries. They simply wondered what I was getting at and brushed it all aside.

The PRESIDENT: I call next on Professor Fawcett, whose name has frequently been mentioned by Mr. Gilbert during the course of the lecture.

Professor C. B. FAWCETT: All will agree that we owe a great deal to Mr. Gilbert for having pulled together in a very presentable form an enormous mass of information on a matter which has been ventilated in this Hall several times and is now given very much wider ventilation. I remember vividly the first time I spoke on it in the old Hall of the Society in 1917.

I suggest we have been discussing rather the areas than the boundaries, and in the discussion of function in relations to the areas one has to reckon the functions of local government in two broadly different groups: first those which used to be called gas and water politics—main drainage lines, main roads and so on. The drainage lines follow the valleys and the valleys are the natural units for such a purpose. In the gas and water services the feelings of the population are usually quite unaffected. If we get our electricity supply efficiently, without breakdowns and at a reasonable price, not many of us will feel regional patriotism arising in respect to the layout of the grid. The second group of functions affect social relations rather than technical services. There is, for example, the relation between the place where you live and the place where you work. One of the strongest adverse criticisms of the present layout of local government areas in this country is that in a very large number of cases it does sever our local relations with our neighbours in terms of everyday life from our local relations with the people with whom we work. Many of us live in the area of one local authority and work in that of another. It has been suggested ever since this matter was first raised for discussion that that means at the least a division of the individual's interest and participation in the local government of those areas. Many live outside London and spend their working-day, which is the most important part of their lives, in the County of London; they retire at evening and for week-ends to, say, the County of Middlesex and may take an active part in local affairs there. But they are somewhat "out of it" in both. Too often the government of a suburban borough is in fact left to the local retail tradesmen because the majority of its ratepayers are not in it during working hours.

The Boundary Commission has suggested for the first time—and it is the first time it has ever been suggested in these discussions—that the area south of the Tees, round Teesmouth, should be kept in Yorkshire and that the area just north of the Tees estuary should be included in Yorkshire. To think of Middlesbrough as not in Yorkshire but in the northern area is a common error. The Commissioners have a new view of the relations of Teesmouth to the regional capitals of Newcastle upon Tyne and Leeds.

The Tyne and the Tees are two rivers which have been county boundaries for a very long time. I believe I am right in saying that the first and oldest Charter

recognizing these boundaries was the Charter of King Athelstan (*c.* 925) which is a confirmation of a deed of gift of the land between Tyne and Tees to the Church as the "Patrimony of St. Cuthbert." At any rate, it is a boundary of extremely long standing.

If you come down to the voluntary associations of the present day, cricket leagues, local football leagues and so on, Tyneside is one conurbation and the whole of the Tees valley is another. They are natural units. And the primary factor to be considered in these areas is the actual distribution of population; also the physical factor, which Professor Taylor emphasized.

At the other end, may I remind you that we had in this country from 1835 until about 1930 a group of units called Poor Law Unions. They were associated with one particular aspect of local government; they got into bad odour because of the Poor Law. But these Unions were formed on sound and simple principle. Each important market town in the country became the centre of a Poor Law Union and the parishes linked with that market town were those whose farmer inhabitants normally came in to do their business at that market town. The whole of Upper Teesdale was one Poor Law Union. When Poor Law Unions were abolished, Teesdale was divided into three county districts, the urban district of Barnard Castle, the rural district of Barnard Castle, and the rural district of Startforth on the south side of the Tees. The obviously natural unit which had been organized as a unit for a considerable period of time was suddenly cut into three. There are a number of instances such as that throughout the country. I suggest that if you want county districts which are reasonably natural units, in terms of the organization of this country just before the Railway Age, you will find them to a large extent in the Poor Law Unions.

The smaller units within towns are of considerable interest. The chief difficulty in that regard is the determination of a neighbourhood unit. If a rural neighbourhood unit, it requires to satisfy two conditions: first, that the number of people shall not be so great that they cannot be neighbours to each other; secondly, that these people shall be near enough to each other to develop an effective social grouping. What is the size, in numbers and in area, of such a unit? It should be the "cell" of a system of local government areas.

Nearly all the suggestions made by geographers have been for the diminution in the number of the larger units. That is obviously a reflection of the fact that within the last 150 years the means of transport have made for much greater accessibility; and I think that there is no possibility of a rational administration of our local government until we get regions based on a number of units reasonable in size. The number of county authorities would, on the Commission's proposals, be changed from 129 to 130, so that there would be no serious change in the average size. But in several cases the Commission suggests two units for one population mass. The suggestion of keeping Leeds and Bradford separate may be a recognition of the sturdy independence of Yorkshiremen; but it is not defensible on other grounds because those county boroughs run into one another as parts of one conurbation. A great deal of the opposition to the merging of such parts of our great urban areas into larger local government units is due to the fact that such amalgamation will reduce the number of officials and that local officials have a perfectly natural interest in keeping their jobs and increasing their own importance. If you want a guide to the feeling in a district concerning such changes it will usually be found to be expressed best by the voluntary organizations—not so much by what they say as by what they do. The cricket teams and football leagues about the Tees are not divided by the river. There is a long-standing North Yorks and South Durham league. I suggest that in most areas the voluntary organizations of the people are a much

better guide to the real ways in which a democratic unit can be organized than are the reactions of officials.

I would like to thank Mr. Gilbert very much and hope his paper will be published soon.

Professor DUDLEY STAMP: There are two related questions which must be faced: the first is, should the county be an essentially heterogeneous unit or an essentially homogeneous unit? The large conurbations are homogeneous units which have a common interest in industry and in their urban life. It might be held that such a county as Herefordshire, by contrast, is the ideal county because it has a balance of rural areas around a central county town and it is an essentially heterogeneous unit in the character of its different lands. It seems to me that there is often confusion between those two points of view.

Very closely related to that is the question of the difference in the urban and rural points of view. When this matter came up for practical consideration in another sphere I felt at first that it did not matter whether the government was urban or rural; national policy as to the best use of the land would not be affected. But it was demonstrated to me very closely that if the boundaries of an urban unit are extended so as to include surrounding rural land, the representation of the country area will be one-tenth (or whatever it may be) of the representation of the urban area and urban interests. Nothing would be more annoying or disastrous to the country people than to have their affairs, important to them, given second place because of that balance of numbers. So, when one remembers that 90 per cent. of the people of this country live in towns, one feels that the whole country may become urban-minded and run on town lines unless one has local government units which are primarily rural.

Professor W. A. ROBSON (London School of Economics): I should like to make one or two comments from the administrative standpoint. I listened with great interest to Mr. Gilbert's paper and I felt that the main implication both of what he said and of the maps which he showed us was that—regardless of what the Boundary Commission may say, regardless of the present conditions of local government—there is an irresistible technical urge for these large regional divisions. The main conclusion which any impartial person must draw from the paper is that both from the standpoint of administrative needs and for technical reasons, which vary in each particular service, there is a need for these large regional areas which have been set up for all these different services and which were demonstrated on the maps.

Taking that as the starting-point of a critique or, if you like, an appreciation of the Boundary Commission's report, it seems to me that although they have good intentions in this respect their recommendations do not meet the need. The Commissioners frustrate their possible recommendations by specifying at the outset an absolutely arbitrary maximum of one million of population for the two-tier and a maximum of half a million for the single-tier counties. These maxima are not based on any stated reasons or on any consideration of the optimum areas of administration or on the maximum possibilities of local government or anything of that kind whatsoever. The Commission have simply fixed these arbitrary maxima, and as a result they are precluded from considering whether larger types of areas are required from the functional or administrative standpoint. That is my first criticism of the Report which emerges from this extremely interesting lecture to which we have listened this afternoon.

The other point is that the Boundary Commission have, in my view, and I think in the lecturer's view, the absolutely right intention of reintegrating town and country. I think we shall probably all agree that that is indispensable, and that the Local Government Act of 1888 made a fatal mistake in separating town

and country so sharply. It has undermined the health and welfare of local government by producing this gnawing struggle at its vitals in the form of the long drawn out conflict between county councils and county boroughs which has been going on ever since that date. The intentions of the Boundary Commission are right and good in this respect, but I greatly doubt whether in effect their recommendations will eliminate that struggle, because they introduce a new type of county borough which they term the "most purpose" authority and which is only left in the county area for the purposes of police forces, fire brigades, town and country planning, highway finance and little else. I do not believe that that is nearly enough. Moreover, since they want to give a large number of non-county boroughs this new county borough status, there will be a great increase of this new type of county borough which will have the effect, so far as I can see, of leaving the rest of the two-tier counties in an even more difficult position than they are at present if they are to provide local government services on the enlarged scale which recent legislation requires. Therefore, although the Commission have the right idea, I believe that the solution they propose is likely to produce all kinds of new difficulties because the county borough is not integrated sufficiently, from the financial and administrative standpoint, with the new two-tier counties. In my opinion the new county borough should be put much more nearly in line, if not completely in line, with the other county districts. There would then be the integration of town and country areas which we all wish to see.

There are many other points I would like to make, but I realize that others wish to speak and I have therefore restricted myself to those two points as my trifling contribution to this extraordinarily interesting and important discussion.

Mr. L. C. W. BONACINA: Mr. Gilbert has given some assurance that the scheme outlined should not lead to the effacement of any of the forty ancient counties of England, and one can only hope that local feeling will prove strong enough to justify his assurance. Nevertheless it seems inevitable that the new groupings would gradually supersede the old and displace them in the school atlases. By the very proposals themselves we should lose at the outset the individuality of Rutland, the smallest county, and of Westmorland, the most mountainous, which, with all its association with Wordsworth, would become a mere geographical expression.

Looking at the matter from the cultural angle, I think it is important that all the ancient counties should remain as far as possible effective units since they have become personified in literature and in every aspect of national life. No doubt many of them do not make particularly good physical units; but they all have history, tradition and folklore with all those various imponderable influences which help in the making of "geographical personality." May I therefore plead for as little break with the past as changing conditions will permit?

Professor S. W. WOOLDRIDGE said he had listened to the paper with much interest but at so late an hour he would content himself with asking a single question. It was natural and right that geographers and others should criticize administrative boundaries now demonstrably outmoded. It might however be wise to enquire whether there was in fact any one definitive solution of the problem they presented. It might readily be shown that existing boundaries were imperfect and it was permissible and useful to suggest improvements. Whether there existed, however, an accepted body of principles by which the boundaries might be determined by "pure investigation" seemed very doubtful. He would value Mr. Gilbert's opinion on this point of view, while making it clear that no criticism was implied of a paper of high interest and practical importance.

Mr. GILBERT: It is difficult to answer all the questions rapidly and on the spur of the moment. First, I would like to thank various speakers for their kind remarks about my paper.

Lord Rennell commented very strongly on the absence of maps from the Report of the Boundary Commission, as I had done in my lecture. It would be possible for the Commission to defend themselves from this charge by explaining that many boundaries have not yet been decided in their plans. Perhaps they were unwilling to publish even a tentative map in case it might be regarded as definite and final in every respect. I do not think that such an excuse can be allowed, as some sort of provisional maps, however rough, are needed to follow the arguments of the Report. I think Lord Rennell misunderstood my remark that Herefordshire was not a "region." I meant to imply that the county was not by itself a province or region in the large sense.

Professor Taylor emphasized the need for more geographical research into the whole problem, particularly with regard to the construction of accessibility maps, and her point was supported by other speakers. I entirely agree with them. Professor Taylor also said that I failed to show the excellent maps of administrative areas produced by the Ministry of Town and Country Planning. My reason for not displaying them is that they are produced in colour, and it would be difficult to adapt them for the screen. I can assure Professor Taylor that I have been poring daily and nightly over two sets of these admirable maps for the last few weeks, one set in my house and another in the Oxford School of Geography, in order to construct the maps which I have shown this afternoon.

I fully agree with Professor Fawcett's remarks about the Boundary Commission's proposals for Teesside. I also agree with what he said about the value of studying the old Poor Law Unions and I recommend those interested in this question to look up the maps of the Poor Law Unions for their own areas. As to Professor Fawcett's point about the areas used by voluntary organizations, I mentioned in my paper the value of the Anglican dioceses in Wales as a possible indication of the most suitable areas for administration.

I was glad that Professor Robson questioned the use of certain figures of population by the Commission as measuring-rods for the construction of areas for administration. The arbitrary choice of 200,000, half a million and one million as arithmetical criteria for areas of local government needs far more explanation and defence than is given in the White Paper. The Commission make certain exceptions which I have mentioned in my lecture, but it is not really clear why these particular figures should be regarded as so vital. I entirely agree with Professor Robson as to the admirable intentions of the Commission to integrate town and country and with him I question whether their proposals will have the desired effect. I know that other persons who are authorities on the subject of administration have the same doubts as those he so clearly expressed.

Professor Stamp introduced the very important subject of the large percentage of urban population in Britain and feared that townsmen, by their very majority, might inflict their views on the rural areas if town and country units were formed. If the conurbations are treated separately the urban preponderance in the rest of Britain is not nearly so great. In rural areas the small town is closely tied up with its surrounding country and I was pleading for the two to be considered together. I was certainly not pleading that the larger towns should dominate the countryside. Perhaps I did not lay sufficient emphasis on the need to strengthen the parish in rural areas.

Mr. Bonacina fears that the traditions of the ancient counties may be effaced in any coming changes. It is worth noticing that in France the entirely arbitrary

departments were formed at the time of the French Revolution and are still the units of administration. But the departments have not destroyed the spirit of the old provinces and the latter have been revived for many regional purposes.

With regard to Professor Wooldridge's question as to whether there is a geographical solution to this problem, I could go on talking for a very long time but I must desist. I will repeat what I said in my lecture, that geographers cannot by themselves produce final solutions of political problems. I am also well aware that a committee of geographers would find it difficult to reach complete agreement as to the best boundaries, even if the committee only considered strictly geographical criteria in attempting to reach a decision. Geography is not an exact science which leads its students to inescapable conclusions. Politicians, not geographers, have to make the final decisions in these questions and the solutions are bound to be compromises between many conflicting arguments. The results of geographical research can be of great value to politicians who care to make use of them but geographical considerations are not the only factors which they have to bear in mind. Nevertheless it is to be hoped that geographical factors will be given their proper weight when the boundaries of local government areas are redrawn.

The ACTING CHAIRMAN (Mr. L. Brooks): I am sure we could continue this discussion for quite a long time, but as the hour is late I must bring it to a close. All that remains for me now is to thank Mr. Gilbert for his paper and to tell him that I am sure we shall all look forward to seeing it in the *Journal*.

Professor G. H. J. DAYSH writes: The comment was recently made that this was a period of regional study rather than regional planning. This is partially true of Great Britain. It would seem that many proposals are being made and decisions taken without there being really adequate study and appreciation of the changing circumstances of regions of the country. Mr. Gilbert's examination of the work of the Boundary Commission demonstrates this and one is forced to the view that some of the recommendations ignore fundamental principles. The suggestion to bring the north bank of Teesside into Yorkshire is just one instance. It shows that the conception of the region (and its bearing upon any readjustments of local authority boundaries) is by no means clear, particularly since the North East Coast, including the southern flanks of the Tees, is one of the best defined units of the country.

It must be emphasized however that even in this unit the regional feeling to which Mr. Gilbert refers is only sporadically apparent. The existence of a voluntary regional organization is certainly some evidence; but in my experience regional feeling is strongest under provocation—provocation of the kind instanced by Mr. Gilbert in his reference to the West region of the B.B.C., or, of a different category, in periods of acute economic distress. Under these conditions regional opposition to any disliked policy (or absence of a policy) can be powerfully demonstrated, but such spasms of regional feeling are seldom sustained. There is an almost inevitable relapse into the more obvious and more persistent parochialism. In some cases regional feeling may never really come to the surface at all since no effective method of canalizing it exists. The regional systems now used by central government provide no satisfactory medium, and it is questionable whether they do effect the decentralization regarded as one of the primary reasons for their existence.

Many of the proposals of the Boundary Commission are hardly likely to bring any latent regional feelings bubbling up to the surface—simply because, as Mr. Gilbert's facts show, the several local authorities will inevitably enter their individual protests (or agreements). Most regions will reflect divided and conflicting views. Local authorities are somewhat restive as a consequence of the

progressive weakening of their responsibilities, and voluntary regional organizations may hesitate to grasp the nettle, and as a consequence regional views will not be clearly expressed.

Nevertheless there may well be a case, as is argued in the paper, for regional councils. There is a need for strong organizations to combat bureaucratic encroachment from the centre and it is equally important that regional views should not be expressed solely through the regional systems of central government. However, this question of regional councils is no simple matter. The definition of functions and responsibilities requires much investigation and pooling of experience.

Meanwhile the Boundary Commission proceeds with its work of readjusting the pattern of the administrative map without local authorities knowing what their full responsibilities will be at the end of the spate of new and proposed legislation, sometimes weakening, sometimes strengthening these responsibilities. Since central government appears to persist in impeding its proper function of establishing fundamental principles, the hope is that decision will be taken to establish an effective fact-finding body to whose work geographers will be prepared to contribute. Conflicting views on the suggestions of the Boundary Commission as to the proper design of new units of administration mean that there is a danger of incomplete and unsatisfactory readjustments now being made. Would it not be wiser to delay decisions until the principles can be defined in the light of the necessary facts? Many of these should emerge from the survey required of the recently specified planning authorities. At the moment some local authorities are conducting somewhat hasty and inevitably incomplete surveys in relation to the present phases of the work of the Boundary Commission. The conclusion is inescapable that unnecessary complications and haste are characteristic. It is true that many readjustments may appear urgent, but if the surveys and plans of the planning authorities are properly guided and conducted there is a case for suspending many adjustments of boundaries until this material is available and really sound decisions can be taken.

MARY SOMERVILLE AND GEOGRAPHY IN ENGLAND

J. N. L. BAKER

MARY SOMERVILLE'S 'Physical geography' was first published in 1848, and twenty-one years later it won for its author, then in her ninetieth year, the Patron's Medal of the Society and, in the same year, the first gold medal awarded by the Geographical Society at Florence. The last edition, edited by H. W. Bates, appeared in 1877 and was in use for many years after. The work therefore forms a link between the formative period of modern English geography, in the middle of the century, and the modern period which begins with what has been called "a treaty with the University of Oxford in 1887, and with Cambridge in 1888." [1] It seems proper that the centenary of the publication of this notable work should not be forgotten.

Mary Somerville was born in 1780 and died in 1872. In the course of her long life she met, on terms of equality, all the leading men and women of an age remarkable for its developments in arts and in science alike. At the end of it she recalled the formal geography she had learned at the village school in Burntisland when "it seemed to me that half the world was terra incognita" and reflected on the "work of great labour" required to bring her geography up to date.[2] It was because she did not neglect this "great labour" between 1848 and 1870 that her book remained fresh and reliable.

She wrote two books before her 'Physical geography' appeared. The first was an English version of Laplace's 'Traité de méchanique céleste,' written for the Society for the Diffusion of Useful Knowledge at the express request of Lord Brougham. It brought a warm letter from Sir John Herschel in which he wrote, prophetically, "Go on thus and you will leave a memorial of no common kind to posterity." The second book 'On the connexion of the physical sciences' grew out of the first. It was published in 1836 and contained much geographical material including a discussion of tides, currents, climate, plant geography and "the infinite variety of organized beings that people the surface of the globe."

In a sense the natural sequel to these books was the 'Physical geography.' It was begun in 1839 but had to be put aside because of the illness of Dr. Somerville. The necessity to produce a second edition of the 'Physical sciences' in 1841 caused a further delay, but the first volume was finished by April 1842.[3] At last, when all was ready for printing, Humboldt's 'Kosmos'

[1] By Grant Duff, President of the Society, in 1892. *Proc. R.G.S.* (new series), 14 (1892) 362.

[2] 'Personal recollections . . . of Mary Somerville,' ed. Martha Somerville, p. 349, London, 1873. This work gives many interesting details of the meetings between Mary Somerville and the leading personalities of her time. There is an essay on Mary Somerville in Mona Wilson, 'Jane Austen and some contemporaries' (1938), based largely on these 'Recollections.' It contains the surprising statement (p. 236) that her 'Physical geography' "was not ready for publication till 1859."

[3] S. Smiles, 'A publisher and his friends,' vol. 2, p. 409, London, 1891.

appeared. Mary Somerville wrote: "I at once determined to put my manuscript in the fire when Somerville said, 'Do not be rash—consult some of our friends—Herschel for instance.' So I sent my MS to Sir John Herschel, who advised me by all means to publish it." [1] The note of dedication to Sir John in the first edition is dated 29 February 1848.

Two years before, Lord Colchester in his presidential address to the Society referred to physical geography as "the basis of all geography—that upon which rests the practical importance of the whole science we profess to cultivate" and regretted that "we possess no complete and satisfactory work on the subject in our language." [2] At that time there was no English translation of 'Kosmos.' In 1848, within a few months of the appearance of Mary Somerville's book, his successor in the Presidency, W. J. Hamilton, was "happy to announce" the publication of her two volumes. "The importance of this subject" he added "renders it the more satisfactory that it should have been taken up and treated by a writer already so well and so favourably known. The graphic style and manner in which the different branches of the subject, not in themselves new, have been arranged and discussed by Mrs. Somerville will, I trust, make her unpretending volumes universal favourites." [3] In the following year Hamilton referred in complimentary terms to the second edition "by which the claims of the authoress to our thanks are very materially increased." [4] And Humboldt, in a warm tribute from "l'auteur de l'imprudent 'Cosmos'," remarked: "Je ne connais dans aucune langue un ouvrage de Géographie physique que l'on pourrait comparer au votre. Aucun fait, aucune des grandes vues de la nature vous échappent. Vous avez profité et des livres et des conversations des voyageurs dans cette malheureuse Italie où passe la grande route de l'Orient et de l'Inde. J'ai été surpris de la justice de vos aperçus sur la Géographie des plantes et des animaux. Vous dominez dans ces régions comme en astronomie, en météorologie, en magnetisme." [5]

For any volume to receive the approbation of three men such as Humboldt, Hamilton and Herschel is enough to guarantee its general merit. In this case it was of particular interest. Humboldt's contributions to, and mastery of, physical geography are well known and need not be repeated. Herschel had already been President of the Royal Astronomical Society (1827–32) and of the British Association (Cambridge, 1845). He had made important observations at Cape Town and was a Fellow of the Royal Society. He was later to edit 'A manual of scientific enquiry' (1849) for the Admiralty, a work containing much physical geography, and in 1859 he was to contribute articles on meteorology and physical geography to the *Encyclopaedia Britannica*.[6]

[1] 'Personal recollections,' p. 286. Humboldt sent the first volume of 'Kosmos' to Herschel in November 1845.

[2] *J.R.G.S.* 16 (1846) lxxxii.

[3] *Ibid.*, 18 (1848) xl, xli.

[4] *Ibid.*, 19 (1849) lv.

[5] 'Personal recollections,' pp. 287–8.

[6] Herschel's article on physical geography was published in book form in 1861. In his last chapter he acknowledged his debt to "the authors of several valuable and excellent works on this general subject which we have consulted." These included the 'Physical atlas' of Keith Johnston, Mrs. Somerville's 'Physical geography,' "and the unpretending but most useful treatise on the same subject by Professor Ansted in the *Manual of Geographical Science*." (Herschel, 'Physical geography,' p. 394, London, 1861.) This 'Manual' was edited by the Rev. C. G. Nicolay and is referred to hereafter.

Mary Somerville

From a drawing by James R. Swinton, reproduced by courtesy of John Murray

Hamilton had learned his geology from Murchison, had won the Patron's Medal in 1844 for his Asiatic researches, and contributed the article on geography to the 'Manual of scientific enquiry.' [1] A later tribute from Murchison may here be added. Referring to the fourth edition of 1858 he said: "for clearness of method, perspicuity of thought, and vast range of subjects, Mrs. Somerville's 'Physical Geography' must call for our warmest approbation." [2]

The 'Physical geography' appeared first in two small octavo volumes.[3] The land was dealt with in the first fourteen chapters, the oceans in chapters XV to XIX, the atmosphere in chapter XX, plant and animal geography in chapters XXI to XXX, and man in the last chapter. The sources drawn upon were many. To her regular reading and to her contacts with explorers and men of science Mary Somerville owed much. Her second husband, William Somerville, who was a man of wide culture and had been the first European to visit some parts of South Africa, never ceased to encourage the scientific pursuits of his gifted wife. She drew upon the work of her personal friends like Sir John Herschel, and of leading men in the world of science like Lyell, Darwin, Murchison, Hooker and Agassiz, and for the second and later editions on the great 'Physical atlas' of Keith Johnston (1st ed. 1848) which made available to English readers the earlier German work of Berghaus. There were many more, and at least fifty are referred to in the text and footnotes of the first edition. As later editions appeared these grew in number. To keep abreast of new knowledge, parts of the book were from time to time re-written. Thus in the fourth edition of 1858 the chapters on North America were largely changed to incorporate the views of H. D. Rogers [4] as expressed in his 'Physical geography and geology of the North American continent.' By this means the book grew both in size and in usefulness, and so long as she had strength Mary Somerville carried out the revisions. When that failed she entrusted the task to H. W. Bates, a geographer of unquestioned repute and then Assistant Secretary to the Society. The preface to the first of his editions, the sixth (1870), notes the additional sources used and explains that the work of the editor was merely to incorporate the new material. Of the first edition Mary Somerville had written: "I have tried to make it more of a readable book than geographical works generally are." [5] That remained its character in spite of all revision.

The book appeared in a year made famous by revolutionary movements in Europe. In the world of geography movements hardly less revolutionary were taking place. Thus, to name but a few, the Hakluyt Society in England and the Imperial Geographical Society of St. Petersburg were founded in 1846. Muravieff became Governor of Eastern Siberia in 1847 and prepared the way for great exploring activity there. In 1848 Bates and Wallace reached Para to begin their great work in the Amazon basin, and in the same year the

[1] 'Researches in Asia Minor, Pontus, and Armenia . . .' 2 vols., London, 1842. Hamilton's article in the 'Manual' dealt with both physical and political geography.

[2] *J.R.G.S.* 28 (1858) clvii.

[3] The first three editions (1848, 1849, 1851) were in two volumes; the others (1858, 1862, 1870 and 1877) in one volume.

[4] Rogers, who had made his name as State geologist in Philadelphia, was appointed Professor of Natural History in the University of Glasgow in 1857.

[5] S. Smiles, *op. cit.*, vol. 2, p. 409.

first of the Franklin search expeditions sailed from England. Livingstone's most important geographical work in Africa dates from 1849, and in 1850 Barth set out for the Sahara. In the academic world also substantial progress was being made in geography.

A notice in the *Edinburgh Review* of the first edition of Keith Johnston's 'Physical atlas' began: "It is when a large and expensive work, like that now before us, issues from the press, that we can reasonably infer that the subject of which it treats has already taken hold of the public mind; and has obtained a place among the intellectual wants of the country in which it appears." The review ended with a note which might well have been written a century later: "Future legislators will probably wonder how those who guided the fortunes and diplomacy of nations could see their way through the intricate relations of the different countries of the world, without the knowledge which maps like the present will have made familiar to themselves: future agriculturists will scarcely understand how their forefathers could have got on without the lights which geology and physiology, and the study of temperatures and rain maps and ocean currents and botanical geography, only can afford. And the reader of books will be surprised that men could pretend to run through such works as the 'Kosmos of Humboldt,' the 'Physical geography of Mrs. Somerville,' or the 'Botanical Lectures of Schleiden,' without having before them a Physical Atlas and its well constructed maps. The time may come when such an Atlas will be as much a part of an ordinary library as a common Geographical Atlas is at the present day." [1]

At Oxford Thomas Arnold, Regius Professor of Modern History, delivered his famous 'Introductory lectures' in 1842. In one of these he pleaded for a new outlook in geography. The real geography, he claimed, "embraces at once a knowledge of the earth and of the dwellings of man upon it; it stretches out on the one hand to history, and the other to geology and physiology; it is just that part in the domain of knowledge where the students of physical and moral science meet together." This new geography differed from the old "plan-like" geography as a picture differs from a ground plan.[2] The premature death of Arnold deprived geography of a great champion. Yet his influence lasted long and can be traced in some text books of geography. Thus Edward Hughes, whose teaching of geography at Greenwich Hospital in 1845 brought favourable comment from the Rev. H. Moseley, one of Her Majesty's inspectors, wrote his small 'Outlines of physical geography' in 1849 (3rd ed. 1852). It carried on its title page a quotation from the lecture referred to above, and was in other ways obviously influenced by it.[3]

In Oxford George Butler, who became a Fellow of Exeter College in 1842 and may therefore have heard Arnold, gave a course of lectures on physical and historical geography in 1853, "the first and last instance, to the best of

[1] *Edinburgh Review*, 89 (1849) 327, 352. The "intellectual wants of the country" in 1948 still include a National Atlas.

[2] Thomas Arnold, 'Introductory lectures on modern history,' pp. 124–7, London, 1842.

[3] On Arnold's influence and on the development of the subject generally, see J. N. L. Baker, "The last hundred years of historical geography," *History* (new series), 21 (1936) 193–207.

his belief, of public lectures on geography given at the University of Oxford." [1] In 1879 Butler advocated the establishment of a lecturership or professorship of geography and "suggested that if there was not enough work in that direction at one University the professor might alternate between Oxford and Cambridge." [2] While Butler was still at Oxford H. H. Vaughan, who held the regius chair from 1848 to 1858, "introduced a great deal of physical geography into his historical lectures." [3] In 1850 H. F. Tozer became a Fellow of Exeter College and, like Butler, was a warm advocate of geography. Within a few years he was to be contributing to Galton's 'Vacation tours,' and his 'Lectures on the geography of Greece' (1873) showed that he too had learned to appreciate the "new" geography of Arnold.

In the examinations at Oxford geography received important recognition in 1850. Its old place in Classical studies was confirmed; a knowledge of it was required in modern history; and physical geography was recognized as a separate, optional subject in the new School of Natural Science along with geology, botany, zoology and mineralogy. No provision was made for its teaching though in practice some parts of the subject were dealt with in the department of Geology. The University Commission of 1857 recommended the establishment of professorships in chemistry, mineralogy and physical geography at Magdalen College but the provision of the two last was never made. After 1872 physical geography was not recognized as a separate subject in the School of Natural Science but was incorporated in geology, and the subject remained in the Examination Regulations for geology until 1916. Ironically enough, Mary Somerville's book appears among those recommended in 1872 though it was not apparently recognized before.[4]

At Cambridge recognition came a little earlier. As at Oxford, geography had long held some place in Classical studies. But in the new age it was unlikely that the University of Whewell and Sedgwick would fall behind that of Buckland and Phillips. The Woodwardian Professor was already required by the terms of Dr. Woodward's will to give four lectures on one of his works, which included 'An essay towards a natural history of the earth,' first published in 1695. Woodward was himself particularly learned in geography; Sedgwick, who held the chair from 1818 to his death in 1873, more than fulfilled the wishes of its founder. Moreover in 1848 the Natural Sciences Tripos

[1] G. Butler, introduction to the 'Public Schools atlas of modern geography, 1872.' He was wrong in assuming his lectures were the first. See J. N. L. Baker, "Academic geography in the seventeenth and eighteenth centuries," *Scot. Geogr. Mag.* 51 (1935) 129–44.

[2] *Proc. R.G.S.* (new series), 8 (1886) 118. His proposal for a chair of *Erdkunde* is described in Josephine Butler, 'Recollections of George Butler,' p. 259, London, 1892.

[3] G. Butler in *Proc. R.G.S.* (new series), 8 (1886) 117.

[4] One of the early products of the new School of Natural Science was Boyd Dawkins, who was a contemporary at Jesus College of J. R. Green. Boyd Dawkins became Professor of Geology at Manchester in 1874 and there taught physical geography. In an undated book list, issued for use with his "physiography lectures," which from internal evidence cannot be earlier than 1893, he gives in one section the sixth edition (1870) of Mary Somerville's book, but he had used it much earlier. For this earlier use and for his support of the new movement in geography see R.G.S. 'Report of the Proceedings of the Society in reference to the improvement of geographical education,' pp. 109–10, London, 1886.

was established and this included geology; the first examination was held in 1851. There is little doubt that as at Oxford physical geography was taught as part of geology and it continued to be taught after Sedgwick's death. McKenny Hughes, who succeeded Sedgwick, said in 1885 that the subject had been taught in his department "for some time." [1]

In London recognition began in 1834 though progress was not continuous. In that year Captain A. Maconochie, R.N., one of the Society's Secretaries, was appointed Professor of Geography at University College. "He appears to have lectured for several terms to a diminishing class, and only ceased to keep alive a spark of interest in Geography as an element in higher education with his appointment to a post abroad." [2] Twenty years later, the Rev. C. G. Nicolay was appointed to a lecturership at King's College. Commenting on this the President of the Society said: "The measure has immediate reference to the project of Government for the improvement of the Civil Service and the benefit of military students. It is, however, founded on the claims of the science of Geography to more distinct cultivation than it has hitherto obtained in schools and colleges, and the lectures will be accessible to the students of all departments as well as to occasional students." [3] Nicolay was Librarian at King's College, and in 1852 edited and contributed largely to 'A manual of geographical science, mathematical, physical, historical, and descriptive.' In the lists of Fellows for 1855, 1856 and 1857 he appears as "Professor" though he never, apparently, held a chair at King's. But in his own 'Principles of physical geography' (1858) he is described as "Hon. Fellow of King's and Queen's Colleges, London, and late Librarian and Lecturer in Geography at King's College, London, and Professor of Geography and History at Queen's

[1] R.G.S. 'Report,' pp. 29, 107, 108, 179, 233. For the new Natural Sciences Tripos see the *Calendar* for 1849. The Chancellor of the University, the Prince Consort, was greatly interested in this movement for reform and played a large part in it. It seemed to him "deplorable that there should be no instruction in geography, modern languages, the history of art, aesthetics and other subjects which educated opinion outside the University considered of importance." (D. H. Winstanley, 'Early Victorian Cambridge,' p. 202.) Prince Albert was greatly helped in his work by Dr. Henry Philpott, who became Master of St. Catharine's College in 1845. It is pleasing to recall that St. Catharine's College, Cambridge, and Jesus College, Oxford, were foremost among the Colleges in their Universities in giving full recognition to geography when it became a separate School.

For the provisions of the Woodwardian Chair, Woodward's qualifications, and the geographical knowledge of Sedgwick, see J. W. Clark and T. McK. Hughes, 'Life and letters of the Rev. Adam Sedgwick' (2 vols., Cambridge, 1890), particularly vol. 1, p. 168, and vol. 2, pp. 491–4.

Francis Galton, later to become one of the pioneers of geographical education, went to Cambridge in 1840. He began his travels in 1845 and in 1853, soon after his return from South Africa, he married the sister of George Butler. Thus he had both professional and personal contact with the new geography. He served on the Council of the Society in various capacities from 1854 to 1893, and it was mainly due to him that the award of medals to Public Schools was instituted. There is no evidence that he ever attended Sedgwick's lectures.

[2] H. R. Mill, "The first London Professor of Geography," *Geogr. J.* 81 (1933) 538.

[3] *J.R.G.S.*, 24 (1854) xcii. For an attempt by Francis Galton to interest the Government in a scheme of lectures to troops at the time of the Crimean War, see his 'Memories of my life,' London, 1908.

College, London." In his 'Principles' a list of authorities is given but Mary Somerville's book is not among them.

Nicolay was succeeded, in 1859 at Queen's College, and in 1863 at King's College, by William Hughes. He is a remarkable but little known figure in the history of geography. His first published work, 'The illuminated atlas of Scripture geography,' appeared in 1840. In the following year he was Professor of Geography at the College for Civil Engineers.[1] He was a great writer of manuals and also edited Maunder's 'Treasury of geography.' "Manuals compiled with so much industry and conscientiousness could not fail of being appreciated by the public; they therefore gradually made their way into some of our best public schools, and new editions were repeatedly called for." [2] In 1870 Hughes was invited to give an inaugural lecture at the newly founded Bedford College.[3] He died in May 1876 after a gallant and not entirely unsuccessful attempt to bring real life to the subject of geography.

A contemporary at King's College was D. P. Ansted. He became Professor of Geology in 1840. "For many years he occupied a prominent position, especially in the scholastic world, as a writer on physical geography. . . . He obtained the appointment of Examiner in physical geography under the Department of Science and Art at South Kensington, a post which he held for many years, and relinquished only when Physical Geography was abolished, in name, as a branch of scientific teaching, and replaced by Physiography, under a new examiner." [4] Ansted wrote the section on physical geography in Nicolay's 'Manual,' and published his own 'Physical geography' in 1867. The book was widely used and reached a fifth edition in 1871.

The reference to physiography recalls the appearance of T. H. Huxley who in 1868 first gave part of a series of lectures "intended to initiate young people in the elements of Physical Science." Of these he wrote: "I borrowed the title of Physiography . . . for my subject, in as much as I wished to draw a clear line of demarcation, both as to matter and method, between it and what is commonly called 'Physical Geography'." [5] Huxley criticized most of the elementary works on the subject for beginning at the wrong end and too often ending "in an *omnium gatherum* of scraps of all sorts of undigested and unconnected information, thereby entirely destroying the educational value of that study which Kant justly termed the 'propaedeutic of natural knowledge'."

While Huxley was lecturing in London, the Rev. Samuel Haughton, Professor of Geology in the University of Dublin, was lecturing on physical geography to the Governess Institution of Ireland. The substance of his lectures, to be regarded "rather as a series of sketches of some important features of physical geography, than as a formal exposition of this attractive and complex branch of knowledge," was published in 1880. He makes one reference to Mary Somerville, quoting at length from Bates' sixth edition of her 'Physical geography' to "give the reader some faint idea of the wonders

[1] At 58 Pall Mall, and later in Villiers Street, Strand.
[2] *Proc. R.G.S.* (old series), 21 (1877) 430.
[3] "Geography in relation to physical science," 12 October 1870 (London, 1870).
[4] *Proc. R.G.S.* (new series), 2 (1880) 382.
[5] Preface to his 'Physiography: an introduction to the study of nature,' London, 1877.

of the Amazonian Silvas" (sic.). It is interesting to find that the first of the two long paragraphs quoted is almost identical with that in the first edition of 1848; the second, describing the "stillness and sombre awfulness of these primeval woodlands," is an addition by Bates.[1]

This long parenthesis on the history of geography in Britain has been inserted to show the state of British geographical learning while Mary Somerville's book was in use. It remains, before appreciating her success and recording her limitations, to say briefly what had gone before. Physical geography was by no means new when her book was published. It was dealt with, at least superficially, in every small text book and at greater length in the larger works. Thus nearly one whole volume out of nine in the English translation of Malte-Brun's 'Universal geography' (1822) was given to physical geography. It covered as much ground as, and occupied greater space than did Mary Somerville's two volumes. Very notable advances had been made elsewhere in Europe and particularly in Germany.[2] Moreover, many of its topics had been the subject of close investigation in Britain by men who would never have described themselves as geographers. Hutton had taught that geographical knowledge, in its widest sense, must precede geological study. Lyell had demonstrated the close connection of geology and physical geography. To Murchison the geologist was but the physical geographer of former periods. And this general attitude was summed up in the words of Buckland: "If we look to the great phenomena of physical geography, the grand distributions of the solids and fluids of the globe; the disposition of continents and islands above and amidst the waters; the depth and extent of seas, lakes, and rivers; the elevation of hills and mountains; the extension of plains; and the excavation, depression and fractures of valleys; we find them all originate in causes which it is the province of Geology to investigate."[3] The volume from which the quotation is taken was one of the famous *Bridgewater Treatises*. Others in the series contained much geographical material, notably those of Prout, Kidd and Whewell. Prout dealt extensively with meteorology, Kidd with the relations of man and nature, and Whewell with the tides.[4] There was also much physical geography in the four volumes of a work not belonging to this series, J. C. Prichard's 'Researches into the physical history of mankind' which reached its third edition in 1836.

It was therefore against a background of accomplished fact and with a foreground of change in geography that Mary Somerville's book was placed. It was not so successful as its author appeared to hope. She openly suggested

[1] S. Haughton, 'Six lectures on physical geography,' p. 237, London, 1880; *cf.* Somerville, 'Physical geography' (1848), vol. 1, pp. 147–8.

[2] This subject is dealt with in the opening sections of R. Hartshorne, "The nature of geography," *Annals Assoc. Amer. Geogr.* 29 (1939) 171–658.

[3] W. Buckland, 'Geology and mineralogy considered with reference to natural theology' (2 vols.), vol. 1, p. 5, Pickering, 1837.

[4] W. Prout, 'Chemistry, meteorology, and the function of digestion considered with reference to natural theology,' 1834; J. Kidd, 'On the adaptation of external nature to the physical condition of man,' 1836; and W. Whewell, 'Astronomy and general physics considered with reference to natural theology,' 1836. Whewell later consulted Mrs. Somerville on what he called "my tide scheme." (Mrs. Stair Douglas, 'Life of William Whewell," p. 194, London, 1881.)

plagiarism as a cause, for she wrote, "I could not superintend the publication of my 'Physical Geography' but Mr. Pentland kindly undertook to carry it through the press. . . . No one has attempted to copy my 'Connexion of the Physical Sciences,' the subjects are too difficult; but soon after the publication of the 'Physical Geography' a number of cheap books appeared, just keeping within the letter of the law, on which account it has only gone through five editions. However, a sixth is now required." [1] It is doubtful if there is much in this complaint. True, competitors used her work and perhaps more extensively than they acknowledged; this is difficult of proof since all reputable writers went to the same sources or claimed to do so. What was serious however was competition of a different kind. In 1850 A. Guyot's 'The earth and man: lectures on comparative physical geography' was published. Guyot had been Professor of Physical Geography and History at Neuchatel before he fled to America. The lectures were given in the Lowell Institute in Boston, and were translated by Professor Felton of Harvard.[2] Guyot was a disciple of Ritter and naturally popularized his view of geography. It was to Guyot, and through Guyot to Ritter, that Butler [3] and Hughes [4] and other leaders of geographical reform in England looked. And when, fourteen years later, an English translation of Ritter's 'Comparative geography' appeared, its translator W. L. Gage significantly introduced it thus: "It has been my earnest purpose to make this work fill a great void in our educational literature; and its convenient size gives it an incomparable advantage over the voluminous works of Sir John Herschel and Mrs. Somerville; while in rigid philosophical precision, in method, in natural growth—not to use that inevitable German word *development* (entwickelung)—even those eminent geographers would, doubtless, award it the palm." [5]

The truth was that Mary Somerville's book failed for reasons which could not be known to her when she published it. On the one hand she embarked on an elaborate study of a branch of the subject just at the time when geologists were claiming it as their own and beginning to teach it seriously in English universities. It soon ceased to be part of academic geography though geographers continued to talk about it and claim it as part of their subject. Nothing better illustrates this movement than the fate of physical geography in the affairs of the British Association.[6] Many of its earliest supporters were

[1] 'Personal recollections,' pp. 293–4. This passage is undated but it appears to refer to the year 1858 or 1859. The fifth edition however was not published until 1862, and the sixth until 1870.

[2] Guyot was Professor of Geography at Princeton from 1855 until his death in February 1884. In addition to the work here noticed he published his 'Primary geography' in 1866, 'Intermediate geography' in 1870, and 'Physical geography' in 1873.

[3] "One of the first books he ever read which opened his eyes to how geography might be taught was a volume of lectures delivered by Arnold Guyot in America . . . he (Canon Butler) derived great advantage from [Ritter's] works, especially his essay on the comparative treatment of geography." (*Proc. R.G.S.* (new series), 8 (1886) 117.)

[4] "Geography—*Erdkunde*—is one subject capable of regard from many points of view, and possessing most diversity of relationship." Inaugural Lecture, 1870.

[5] C. Ritter, 'Comparative geography,' translated by W. L. Gage, New York, 1864.

[6] Mary Somerville did not attend the meeting at Oxford in 1832 "for fear that her presence should encourage less capable representatives of her sex to be present." (Mrs. Gordon, 'Life and correspondence of William Buckland,' p. 123.)

those whose names have appeared in this article—Sedgwick, Whewell, Murchison, Buckland, Phillips—and all believed in physical geography. In the earliest form of "Sections" in the Association, Geology and Geography appear as one, and of the twelve members, two became Presidents of the Royal Geographical Society and eight others are known to have had some interest in geography though most of them were geologists. In 1839 Section C, formerly Geology and Geography, became Geology and Physical Geography.[1] "Its scope was limited in consequence; in 1838 there were geographical papers on expeditions to Novaya Zemlya, the Antarctic, and the Euphrates (the last the famous ascent of the river by Lynch), besides papers on various surveys and other topics; in 1839 communications of this character are wanting. The change clearly suggests a not unnatural conflict of interests in the section as originally constituted. . . . Geography does not appear as a separate Section (E) until 1851.[2] Murchison, by this time an ex-General Secretary and past President of the Association, was also a powerful supporter of the Royal Geographical Society and he was the first President of Section E. He assisted to establish the section avowedly as a public 'draw' and was instrumental in including in its earlier programmes such widely attractive names as Livingstone, Speke, Baker, and Burton."[3] Thus physical geography became divorced from geography and when Mary Somerville's book appeared there was no Geography. When geography was revived it was as a popular subject concerned largely with travel and exploration.

Against this splitting of geography William Hughes never ceased to protest. "Many persons speak of physical geography as though it were something distinct from other geography, to be kept apart from it, and to be approached by different paths: as though geography (so called) was one thing, physical geography another. I believe this to be a very great error. Physical geography is in truth an essential part and parcel of *all* Geography."[4] The leading idea of his books was to show "the connection of physical geography with the industrial pursuits and social condition of nations, or, in other words, the *geography* of industry and commerce, viewed as dependent on the natural features, climate, and productions of the various regions of the earth."[5] Even Murchison saw the danger though when it was too late. In his last Presidential Address to the Society he pleaded with geologists not to become too biological

[1] This change was made at the suggestion of Murchison. H. R. Mill, "Geography at the British Association: a retrospect," *Scot. Geogr. Mag.* 47 (1931) 338.

[2] In 1851 the new section became Geography and Ethnology and it was not until 1878 that Geography stood alone as a Section. Mill, *op. cit.*, p. 339.

[3] O. J. R. Howarth, 'The British Association . . . a retrospect,' pp. 83–4, London, 1931. A similar development happened in the United States. In the American Association for the Advancement of Science, there was in 1851 a section of geology and physical geography and another of ethnology and geography, but that arrangement did not last, and generally geography had no recognized place. In 1882 Section E, Geology and Geography, was established, but until 1903 "not one of the vice-presidential addresses has been concerned with the subject second named." See W. M. Davis, "Geography in the United States," *Proc. Amer. Assoc. Adv. Sci.* 53 (1904).

[4] W. Hughes, 'The study of geography: a lecture,' London, 1863.

[5] *J.R.G.S.* 30 (1860) clxxxviii. For a less favourable view see J. Scott Keltie in the 'Report of the proceedings of the Society in reference to the improvement of geographical education' (1886), p. 19.

and urged them to believe that "in the study of fossils, they do not exhaust the possibilities of geology; that there is still a wide non-biological field for them to conquer; that in proportion as they master it they will advance to truer and more comprehensive views of the history of life, and thus aid us in the investigation of that planet with which we, as geographers, are specially concerned." [1] Yet the division remained. Keltie, in 1885, found that "the strongest opposition to geography as a distinct field of research comes from the side of geology" [2] and appealed to Dr. (as he then was) A. Geikie. He got little comfort, for Geikie said, "In its true sense geography is a branch of geology; and where there is already a Professor of Geology, I would not in the present at least advocate the establishment of a separate Chair of Geography."[3]

Geographers in their efforts to improve matters actually made them worse. The policy of the Society in trying to encourage geography in the Public Schools, largely inspired by Francis Galton, perpetuated the state of division. Medals were given for proficiency in physical geography and in political geography from 1869 until 1884 when the experiment was abandoned.[4]

Deprived by degrees of physical geography, academic geography was left with "political" geography. Here there was not wanting a succession of books dealing more or less adequately with the subject. When H. G. Bohn wrote his 'Pictorial hand-book of modern geography' (1st ed. 1860) he quoted fifteen other "modern geographies." The numbers of such books, he said, "are legion." He founded his own book on "Malte Brun and Balbi's *System of Universal Geography*, with the additions of Mr. James Laurie." That work of over a thousand pages was first published in 1842, yet Bohn could say of it: "This is certainly the most comprehensive and complete volume of its kind now before the English public and, excepting that it does not give the recent political changes, or the latest census of population, leaves little to add or improve." [5] In such a world of geography there was no place for the work of Mary Somerville.

Thus whatever failures her work had were due to historical accident rather than to faults of the book itself. It is unjust to describe it as "descriptive almost in its entirety, with no attempt to account for phenomena." [6] There is a great deal of "accounting for" with a minimum of words, such as "Single mountains, isolated on plains, are rare except where they are volcanic"; or "The chain of islands in the Spanish main is merely the wreck of a more northern ridge, broken up into detached masses by these irresistible powers"; or again "the mean annual temperatures of the air would be constant on each parallel of latitude, and would decrease regularly from the equator to the poles, were it not for the inequalities in the form and nature of the surface of the globe." These examples, chosen for their brevity, could be greatly

[1] *Proc. R.G.S.* (old series), 15 (1870–1) 313.

[2] R.G.S. 'Report,' p. 31.

[3] *Ibid.*, p. 32.

[4] Two schools, Liverpool College and Dulwich College, together won thirty of the sixty-two medals awarded. George Butler was the Head Master of Liverpool College.

[5] Preface to 'A pictorial handbook of modern geography,' p. iv. Bohn was brought up on the well known 'Geography' of W. Guthrie.

[6] R. E. Dickinson and O. J. R. Howarth, 'The making of geography,' p. 178, London, 1933.

extended if space allowed. They entirely refute the charge that the work is merely descriptive.[1]

In many respects the work was considerably in advance of its time. There was some attempt made to relate physical and human facts. Thus, comparing the length of coastlines in relation to the sizes of the continents, "the proportion is most favourable to Europe with regard to civilization and commerce"; or "on the very summit of the Andes [in the plain of Quito] is a world by itself, with its mountains and its valleys, its lakes and rivers, populous towns and cultivated fields"; or again "the hydraulic system of Europe is eminently favourable to inland navigation, small as the rivers are in comparison with those in other parts of the world; but the flatness of the great plain, and the lowness of its watershed, are very favourable to the construction of canals." Here again examples are only limited by the space available.[2]

It is no exaggeration to say that in so far as the book failed as a book it did so because it was too good. William Hughes defined geography thus: "mere names of places . . . are not geography. . . . To know by heart a whole gazetteer full of them would not, in itself, constitute anyone a geographer. Geography has higher aims than this: it seeks to classify phenomena (alike of the natural and of the political world, in so far as it treats of the latter), to compare, to generalise, to ascend from effects to causes, and, in doing so, to trace out the great laws of nature and to mark their influences upon man. This is 'a description of the world'—that is Geography. In a word Geography is a Science—a thing not of mere names but of argument and reason, of cause and effect." [3] Mary Somerville approached the subject from a different angle. "The change produced in the civilized world within a few years, by the application of the powers of nature to locomotion, is so astonishing, that it leads to a consideration of the influence of man on the material world, his relation with regard to animate and inanimate beings, and the causes which have had the greatest effect on the physical, moral, and intellectual condition of the human race." To assess the influence of man it was first necessary to examine "the former state of our terrestrial habitation, the successive convulsions which have ultimately led to its present geographical arrangement, and to the actual distribution of land and water, so powerfully influential on the destinies of mankind." [4] And at the end of her book, in a chapter on the "Distribution, condition, and future prospects of the human race," she summarizes the effects of the physical features on many aspects of human activity and discusses the influence of man on the material world. "The influence of external circumstances on man is not greater than his influence on the material world. It is true, he cannot create power; but he dexterously avails himself of the powers of nature to subdue nature. Air, fire, water, steam, gravitation, his own muscular strength and that of animals, have been the instruments by which he has converted the desert into a garden, drained

[1] For longer explanations see for example the causes of floods in the Indian rivers (vol. 1, pp. 100, 271), or the distribution of vegetation (vol. 2, pp. 56–9).

[2] Some of these examples were derived from the works of Humboldt published before his 'Kosmos.'

[3] W. Hughes, *op. cit.*

[4] 'Physical geography,' vol. 1, p. 1.

marshes, turned the course of rivers, cut canals, made roads, cleared away forests in one country, and planted them in another. By these works he has altered the climate, changed the course of local winds, increased or diminished the quantity of rain, and softened the rigour of the seasons. . . . Man's influence on vegetation has been immense. . . . Animals yield more readily to man's influence than vegetables. . . . The influence of man on man is a power of the highest order, far surpassing that which he possesses over inanimate or animal nature; and at no time did the mental superiority of the cultivated races produce such changes as they do at present." [1] Here she was passing into the field of what was generally accepted as "political" geography, and it is a further example of her advanced views on the subject. It is of interest to find that Ansted, in the 'Manual of geographical science' already mentioned, made a brief reference to this side of the subject, but it is clear from internal evidence that he made great use of the 'System of universal geography' edited by J. Laurie and it is almost certain that he got his ideas from that source. His own treatment is far inferior to that of Mary Somerville, and it was not until after the publication of the Hon. G. P. Marsh's 'Man and nature, or physical geography as modified by human action' (1864) that Ansted dealt at any length with man's influence on nature.[2]

Marsh was fully conversant with the developments of geography. "The labours of Humboldt, of Ritter, of Guyot, and their followers have given to the science of geography a more philosophical, and, at the same time, a more imaginative character than it received from the hands of their predecessors," he wrote. "Perhaps the most interesting field of speculation, thrown open by the new school to the cultivators of this attractive study, is the inquiry: how far external physical conditions, and especially the configuration of the earth's surface, and the distribution, outline, and relative position of land and water, have influenced the social life and social progress of man." [3] . . . "It was a narrow view of geography which confined that science to delineation of terrestrial surface and outline, and to description of the relative position and magnitude of land and water. . . . Even if the end of geographical studies were only to obtain a knowledge of the external forms of the mineral and fluid masses which constitute the globe, it would still be necessary to take into account the element of life; for every plant, every animal, is a geographical agency, man a destructive, vegetables, and even wild beasts, restorative powers." [4] Marsh refers several times to the fifth (1862) edition of Mary Somerville's book, and once to the Italian translation of it by C. Bianchi (1861). He clearly accepted it as a standard work though he used similar books by other writers including that of Herschel.

It has been stated by Dr. Hartshorne that in the opinion of some scholars Mary Somerville's book had some influence on the work of Elisée Reclus.[5] Such a claim can be neither refuted nor upheld. Reclus was a pupil of Ritter

[1] 'Physical geography,' vol. 2, pp. 261–7.

[2] For Ansted's dependence on Laurie, *cf.* Laurie, *op. cit.*, pp., 90–91 and Ansted, *op. cit.*, pp. 328–9; Laurie 109–10 and Ansted 409. For Ansted's use of Marsh see his 'Physical geography' (5th ed., 1871), chap. 22.

[3] G. P. Marsh, 'Man and nature,' p. 8, London, 1864.

[4] *Ibid.*, pp. 57–8.

[5] Hartshorne, *op. cit.*, p. 261. No authority for this statement is given.

and shared many of his views.[1] Mary Somerville never mentions Ritter, and probably owed nothing to him. None the less she came to develop ideas not entirely dissimilar and she shared with him the teleological views which also characterized the authors of the *Bridgewater Treatises* and many other scientific writers. It will be recalled that the translator of Ritter's 'Comparative geography' counted on the approval of Mary Somerville for its "rigid philosophical precision in method." It is quite likely therefore that though there was a superficial similarity between 'La terre' of Reclus and her 'Physical geography' there was no direct connection. Even without this added importance her work deserves better recognition than it has received.[2] Its many editions are valuable commentaries on the growth of the subject, and the book is worth reading both for its English style and for its geographical content. "Geography has assumed a new character," she wrote, "by that unwearied search for accurate knowledge and truth that marks the present age and physical geography is altogether a modern science." [3] The last claim can hardly be maintained but there is no doubt that accuracy and truth mark the pages of a work that gave new character to geography.

In the year in which Mary Somerville died Francis Galton was President of Section E of the British Association, and in a remarkable address he tried to set forth some of the principles of the new geography. "The configuration of every land, its soil, its vegetable covering, its rivers, its climate, its animal and human inhabitants act and react upon one another. It is the highest problem of Geography to analyse their correlations and to sift the casual from the essential." [4] Two years later the Society sent a memorial to H.M. Commissioners of the University of Oxford, to those of Cambridge, and to the Governing Bodies of either University urging the establishment of chairs of geography. In this they remarked "that of all the subjects handled by those graduates of Cambridge who hold the office of lecturers in the great provincial towns, in connection with the Cambridge University Extension scheme, none has been so popular as physical geography." [5] The memorial produced no results. Then, in the winter of 1885–86, the Council of the Society "proposed to assist by a small grant the geographical lectures given . . . as part of the Oxford University Extension scheme. The syllabus of these lectures, prepared by a distinguished young Oxonian, Mr. Mackinder, is one of the most hopeful signs . . . of the tendency to a better appreciation of the claims of geography as a mental discipline to students." [6] Finally in 1887, ten years after the publication of the last edition of Mary Somerville's book, geography began to receive its proper recognition as a subject fit to be taught in the universities of Britain, and it is of interest to recall that it came then partly through the activities of the Royal Geographical Society and

[1] Reclus quotes Herschel's 'Physical geography' and uses many of the same sources as Mary Somerville, but he makes so many references to Ritter that his debt can hardly be doubted.

[2] An exception must be made of Dr. H. R. Mill, *op. cit.*, p. 339, where he refers to Mrs. Somerville as "making physical geography a living science in England."

[3] 'Physical geography,' vol. 2, pp. 275–6.

[4] H. R. Mill, *op. cit.*, p. 343.

[5] R.G.S. 'Report,' pp. 82–3.

[6] *Ibid.*, p. 240.

partly through a meeting of Bates, Assistant Secretary of the Society, and Mackinder. Mackinder's Extension lectures on what he called "the new geography" had come to the notice of Francis Galton, and at his request Bates sent for Mackinder. In this strange way Bates, the editor of Mary Somerville's book, was the link between the geographer of 1848 and the maker of modern geography in Britain. Bates asked Mackinder to write down what he meant by the "new geography." The result of the meeting was that Mackinder read a paper "On the scope and methods of geography" to the Society on 31 January 1887. Foremost in his argument was the claim that geography was one, an argument used many years before by Hughes, and that a division into "physical" and "political" was both unsound and unreal. In a paper to the British Association later in the same year Mackinder repeated these principles. Geography was a descriptive analysis of the earth's surface from which he reasoned backwards to causes and forwards to effects. The causes were largely geological, the effects mainly on man. Physiography was indispensable to the geographer but physiography was not geography.[1] This was more revolutionary than anything Mary Somerville believed, yet one cannot help feeling that she would have approved, for to her what mattered was the "new character" of geography.

It was Murchison who succeeded "in inducing the Council to award the Victoria or Patron's Medal to Mrs. Mary Somerville, 'who throughout a very long life has been eminently distinguished by her proficiency in those branches of science which form the basis of physical geography, and who, having published a most able work on that science, was recently occupied in her eighty-ninth or ninetieth year, in solving abstruse mathematical problems'." Of this award she said: "An honour so unexpected, and so far beyond my merit, surprised and affected me more deeply than I can find words to express." This modesty was characteristic of a woman known equally for her scientific accomplishments and her personal charm. She was a good linguist, a musician, and an artist of ability. In her youth her "rare and delicate beauty, both of face and figure" won for her the sobriquet of "the rose of Jedwood." In middle age Murchison described her as "the all-accomplished, sensible, modest, and retiring Mrs. Somerville." She took the scientific world of Whewell and Sedgwick by storm: the former wrote of "the very feminine, gentle, lively person with no kind of presence to superiority in her manners or conversation." Long after, in 1869, when Sedgwick wrote to her to commend his niece, then visiting Italy, he recalled her visit and wished that his niece "should speak to you face to face and see (for however short an interview) the Mrs. Somerville of whom I have often talked with her in terms of honest admiration and deep regard." In her last year, "busy in the morning with my own studies, and passing the rest of the day on the terrace with my daughters," she regretted, among other things, that she would not live "to know the result of the expedition to determine the currents of the ocean . . . and the source of the most renowned of rivers, the discovery of which will immortalize the name of Dr. Livingstone," but had "every reason to be

[1] For these papers see *Proc. R.G.S.* (new series), 9 (1887) 141–6 and 698–701. For Mackinder's account see *Geogr. J.* 57 (1921) 376–84, and E. W. Gilbert, *ibid.*, 110 (1947) 94–9.

thankful that my intellect is still unimpaired." Her beauty too she kept to the last day of her life. Her bust, by Chantrey, was placed by the Royal Society in their rooms in 1836; another was modelled in Rome in 1844 by L. MacDonald; a crayon drawing by James Swinton done in London in 1848 is said to be the best likeness of her.[1] Her name is perpetuated in the second woman's Hall to be founded, in 1879, in Oxford and now known as Somerville College; the arms and the motto of her family, *Donec rursus impleat orbem*, have been adopted by the College as its seal.[2]

I wish to express my thanks to Mr. R. A. Skelton, Dr. E. Lynam, Mr. G. C. Godfrey, Mr. E. W. Gilbert and Mrs. E. Lobel, Librarian of Somerville College, for help in the preparation of this paper.

THE WATER RESOURCES OF CENTRAL AFRICA

FRANK DEBENHAM

Joint Meeting of the Geographical Association, the Institute of British Geographers, and the Society, 2 January 1948

FOR ADMINISTRATIVE PURPOSES the term Central Africa is now used to denote the area comprised in the two Rhodesias and Nyasaland. Since these territories are some distance from the geographical centre of Africa the name is a little misleading. For the purpose of this paper we might include also the greater part of the Bechuanaland Protectorate and call it, more vaguely still, the "Livingstone country"; for that great man discovered most of it, traversed it from one ocean to another and finally died his lonely death by the swamps of Lake Bangweulu in the present Northern Rhodesia.

Those who have read his 'Missionary travels' will remember what an eye Livingstone had for the future and how accurately he assessed the human value of the country he was the first to visit. In effect his journals seem to say: "Here is wonderful country with good soil, water and population; if we introduce trade to undercut slavery and Christianity to promote peace, we should lay the foundations of prosperity." For various reasons progress has been slower than he anticipated and hindrances such as the partition of Africa and two world wars have checked development.

We are now looking at Africa with a new interest because of the world shortage of food, and wondering whether Central Africa in particular should

[1] This appears as the frontispiece to her 'Physical Geography' and is reproduced here, facing p. 208.

[2] The personal details are from H. R. Mill, 'The record of the Royal Geographical Society, 1830–1930,' p. 91, London, 1930; A. Geikie, 'Life of Sir Roderick Murchison' (2 vols.), vol. 1, p. 212, London, 1875; Mrs. Stair Douglas, 'The life of William Whewell,' p. 142; J. W. Clark and T. McK. Hughes, 'Life and letters of the Rev. Adam Sedgwick,' vol. 2, p. 445; the *D.N.B.*; and 'Personal reminiscences,' *passim*.

continue to be merely a subsistence area feeding only itself with little or nothing to spare for more populous regions. For these and other reasons the British Government has been assessing the prospects of development for many years, beginning with the "African Survey" directed by Lord Hailey and followed by other surveys which are supported by the Commonwealth Development and Welfare Grants. It is perhaps not generally known that this planning is being continued with increasing usefulness, the original broad survey being expanded by intensive study of details without haste and without rest. The survey of the water resources of Central Africa was but a very small part of this widespread inquiry into possibilities.

You will no doubt be wondering how a geographer came to be charged with an investigation into water resources, which on a narrow view would seem to be the duty of a hydraulic engineer. In other words, what does such a study involve? To begin with there must be an appreciation of where the water comes from, the avowed subject of the meteorologist and the climatologist; we must also know where it goes to, the study of the geologist and the physical geographer. Then we must consider where best to use it and in what way, for which we turn to the applied branches of biology, agriculture and forestry, fisheries and so on. Since Africa has the largest potential water-power resources of all the continents, the engineer and the industrialist must have their say, and over all these scientists the economist must exercise some restraining influence. Most important in nearly all respects is the human element, for the effect of development on the inhabitants must be most earnestly studied; so the administrator, the sociologist and the anthropologist must be consulted, and the public health specialist must not be forgotten. Obviously the ideal requirement is a team, perfectly coordinated and balanced, and capable of speaking with one voice; next best is a man whose studies have led him into all or most of those fields.

Now geographers have sometimes been accused of putting no boundaries to their subject, of dabbling in a variety of disciplines to achieve a synthesis of them all and, indeed, of having no very clear purpose beyond that of description. Here is a chance for the geographer to prove that his aim is far more fundamental than that, and to use his comprehensive training to provide a balanced judgment on a complicated problem. It may be submitted that a successful study of such an element in development as water resources would be a notable justification of geography as an advanced study of university standard.

In such a study the first thing is the collection of data concerning such factors as the rainfall, not forgetting its seasonal character; the discharge of rivers, the content of lakes and so on. Of these data there is a regrettable but unavoidable scarcity in Central Africa. Indeed it is greatly to the credit of the administrators of Northern Rhodesia and Nyasaland that the rainfall records are as complete as they are. For general purposes these records provide a good basis, and a little arithmetic shows that as regards actual annual rainfall (that is to say, the total amount of water reaching the ground) most of Central Africa is well endowed. What matters much more than the total quantity of rain water, however, is when it falls and what becomes of it. It is of course seasonal, and one may say that by and large Central Africa has from three

to five months wet season, and from seven to nine months dry season. It is the dry season which provides the real problem, and leads us to ask what becomes of the surplus which falls in the wet season.

Studies of the "run-off" in Nyasaland by Dr. Dixey,[1] and in Northern Rhodesia by Dr. Kanthack,[2] have given valuable figures and these suggest that for this part of the African plateau the run-off may be from 4 to 10 per cent. of the rainfall, according to local conditions. Accepting those figures for the moment, it remains to account for the remaining 90 to 96 per cent., and to do this one is forced to rely on little better than intelligent guessing. The fact that evaporation, measured from an open surface of water, is from 4 to 9 feet in the year does not help very much, and the proportion of water which sinks into the ground is notoriously difficult to assess. It is certain that there is a great deal of water underground available for tapping by wells and bores, but there is as yet no means of determining its amount. A good deal of it probably comes to the surface again as seepage and springs and contributes to the discharge figure. In short, no reliance can be placed on equations with terms of indefinite value and it is necessary to look for other indications of what happens to the rainfall after it reaches the ground.

It is here that biology, and particularly that branch of it known as ecology, provides a key which is perhaps not yet fully appreciated. Annual grasses are not of much value for conserving water, nor even is perennial herbage with a pronounced resting season; but trees—that is to say, forest cover—are a natural integrator of water resources. They have to adapt themselves to the amount available throughout the year, and over a great number of years. It is therefore very significant that in all Central Africa there is no true tropical jungle, or so little that where it occurs—in higher areas, in swamps or along river banks—it receives a special name, *mzitu*. Nor is there much tropical forest such as there is in the Belgian Congo. What one sees for endless miles on the plateau of Northern Rhodesia is savannah woodland, a sparse grass under rather small trees, most of them with crooked trunks and many of them having a dreadful array of thorns. In fact, one can almost correlate thorniness with aridity. Work such as the ecological survey of Northern Rhodesia by Trapnell and Clothier[3] is in many respects a better guide to the potentialities of the land than figures of rainfall.

We shall see later that vegetation, besides acting as an indicator of climate, plays a most important part in both the conservation and the wastage of water resources in Africa.

Another and more obvious indicator of water is the swamp or, as it is called in Central Africa, the *dambo*. Whether seasonal or permanent, a swamp is in effect an arrestment of water, a kind of natural conservation. It is difficult to overestimate the importance of the dambo in Central Africa. The proportion of land occupied by dambos is large, up to 25 per cent. on the

[1] F. Dixey, 'Weirs, dams and reservoirs' (Nyasaland Protectorate, Geological Survey, Water Supply Paper No. 3), Zomba, 1929.

[2] F. E. Kanthack, "Relationship between rainfall and run-off in central Southern Africa," *Proc. S. African Soc. Civil Engineers*, 43 (1945) 29–48.

[3] C. G. Trapnell and J. N. Clothier, 'The soils, vegetation and agricultural systems of North Western Rhodesia' (Report of the Ecological Survey), Lusaka, 1937; C. G. Trapnell, corresponding report for North Eastern Rhodesia, Lusaka, 1943.

level parts of the plateau. Like swamps in temperate lands they represent areas of clogged drainage, but they are more widespread because the growth of swamp vegetation is so much more rapid under the tropical sun. For the same reason they usually have a pronounced gradient; indeed many streams are little more than one long valley dambo. In their natural state they are a wasteful form of conservation since the evaporation from the surface of the aquatic plants is enormous, but they do delay the run-off of the wet season rainfall and are therefore conducive to the permanence of streams. This is not the place to go into the question of how best to use these dambos by a combination of partial draining and partial damming, but we should note that the wrong way is to drain them completely as was done in the early days in some places in the Union of South Africa, with disastrous consequences.

From the wet dambos we may turn to the other extreme, so characteristic of a hot climate and a markedly seasonal rainfall, namely dry river beds filled with sand, commonly known as "sand rivers." Like the dambos, the sand rivers are a kind of natural conservation but with a much shorter life. In the rainy season they are true rivers, of course, but within a few weeks or even days of its close they have come to consist of dry sand on the surface with wet sand below. The water held in the sand is about one-third the volume of the sand itself, and it is protected from evaporation and from pollution by animals. On the other hand it is seeping away through the sand and is lost altogether in a few weeks, usually long before the dry season is over. The natives, and even the elephants and other big game, use it while it lasts by scraping holes in the sand, an age-old method. Such sand rivers are found in semi-arid areas where there are grasslands, and where a much larger pastoral industry could be maintained if there were sufficient watering points.

Obviously something might be done to improve this source of dry-season water, and we may consider for a moment how to set about it. We need to delay the seepage of the water through the sand, and various methods have been suggested. One of these at least is being tried in the Bechuanaland Protectorate, which has many sand rivers. The river used for experiment there has a depth of about 6 feet of sand and about 3 feet of clay. A trench about 6 feet wide has been dug across the river down to the clay, and within it a trench 3 feet wide has been dug into the clay, the spoil being piled on top of the undisturbed clay and the trench then being filled again with the sand. This gives a sort of sub-sand dam of clay, probably not absolutely impervious but sufficiently so for the purpose in view. A series of these dams has been made for some miles up the river at a cost of about £500 and they are expected to impound about 70,000,000 gallons of water.

There are other methods of building such sub-surface reservoirs, of which the following is to be tried in Kenya. A borehole is easily put down through sand with a small pump which forces water down a pipe, flushing the sand up outside the pipe, a process known as jet-drilling. When the pipe reaches the bottom of the sand it is used to convey, under slight pressure, a fluid mixture or "slurry" of cement (or of lime or even of clay) into the sand, the pipe at the same time being withdrawn at a suitable rate. This mixture flows into the sand round the pipe and forms a pillar of slightly consolidated sand. The process is repeated at intervals across the sand river, producing

very quickly and cheaply a sub-surface blockage or dam. The tops of these blockages must be below the original surface of the sand to protect it from floods, during which the uppermost layer of sand is being rolled along by the water. This method of conserving water is only one instance of what man is trying to do in all arid countries, namely to conserve water from evaporation, the real enemy of the water engineer in such places.

In this connection I might mention an amusing disagreement which took place among a group of European farmers in Northern Rhodesia. One of them had built a dam across a stream giving a depth of about 6 feet of water for the use of his stock. The others said that such a shallow dam could not be of any use since the evaporation there was known to be about 6 feet in a year. The owner said that nevertheless the water remained at about 6 feet in depth throughout the dry season and we were all invited to come and see it as proof. The true reason for this was that any dam holds up not only the visible water behind it but also a great deal of invisible water in the surrounding soil. In the jargon of the geologist, it raises the water table, which is not a level surface but has a gradient. In suitable country this soil water may seep into the reservoir as fast as it is dried up by evaporation.

One cannot travel through such countries for long without coming to the conclusion that quite the best way to conserve water is to keep it underground. To convey it some distance to a watering point, for instance, it will often pay to pipe it, strange as this may seem. One might almost say that the most urgent need of the dry pastoral areas of Africa is for cheap piping, and one sighs for the thousands of miles of steel pipe used as marine defences round our coasts and now rusting away to final dissolution while they might be changing the face of some of the African semi-deserts.

So far we have been considering means of finding or conserving water where it is in short supply, but there are equally urgent cases where the problem is precisely the opposite one, to relieve areas of too much water. The rest of this paper is devoted to a brief outline of two major problems of this type: the first the problem of the lake with a sloping surface and the second that of the lake with a cyclical rise and fall, respectively Lake Bangweulu and Lake Nyasa.

The real source of the mighty Congo is at a point between Lake Tanganyika and Lake Nyasa where the Chambesi River rises and flows south-west for some 200 miles. Here it splits into several channels at the eastern end of the large and ill-defined Lake Bangweulu, about two-thirds the size of Wales. It issues from the south-west corner of this triangular expanse as the Luapula River, which later turns north and flows into Lake Mweru and thence into the Congo itself. As will be seen from the map, Lake Bangweulu proper is a comparatively small area of open water at the north-west corner of the whole flooded region, the remainder being occupied by swamps which, however, are for the most part at least 10 feet deep in water. Scattered over the swamps are a few low sandy islands and one large sandy bank, known as the Lunga Bank, and these normally support a population of several thousand Africans. The wet season produces a rise in the water of from 2 to 4 feet, at which time the people have to stay on the islands, but when the floods subside the Lunga Bank is a particularly fertile area, chiefly used for cassava. In recent years

this Bank has been permanently flooded, rendering homeless a very large number of the former inhabitants who have had to be moved to the "mainland." The energetic Provincial Commissioner of the Northern Province, Mr. Howe, was most anxious to know why this flooding had occurred and how it might be alleviated, and he arranged with the authorities at Lusaka that we should be guided round the swamps by a District Commissioner, Mr. Brelsford, who is well known to this Society since he has published articles in the *Geographical Journal* concerning the channels in the swamps.

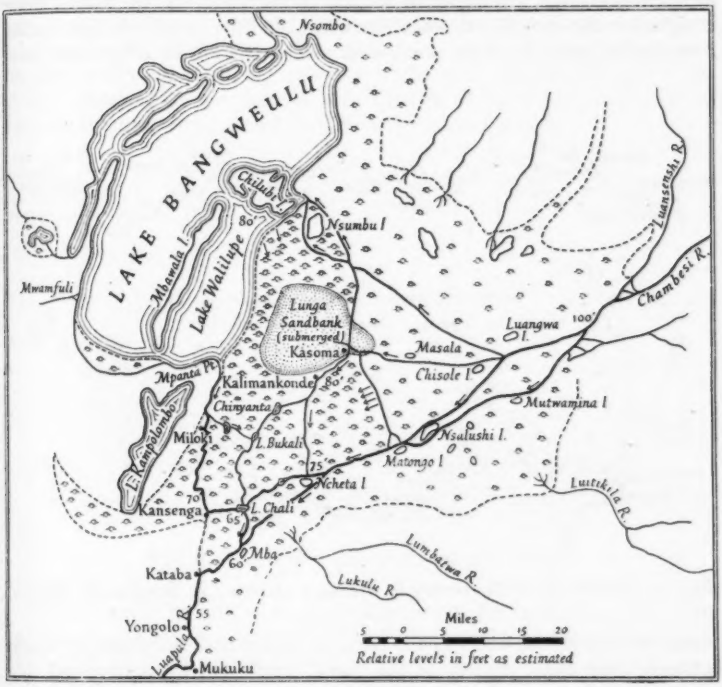


Figure 1

Accordingly a convoy of canoes, one of steel and the remainder native "dug-outs," crossed the lake with our party and entered the swamps at Mpanta Point to begin a fascinating journey through the channels, bordered everywhere by reeds and papyrus. It was obvious that the direction and rate of flow in these reed-lined channels was of importance. There are practically no spot-heights on such maps as exist, so a compass traverse on a large scale on which to enter these observations was begun (Fig. 2), and it soon showed most curious phenomena. For instance, the current would be strongly against the paddlers in one place and yet a few hundred yards farther on in the same channel it would be just as strongly with them. A wide channel would suddenly come to a dead end and a swirl of water there would show that it

plunged beneath the dense wall of papyrus, escaping under rather than through the undergrowth. In some places one could walk dangerously over the dense mat floating on the water, as does the curious splay-footed antelope, the *situtunga*, which makes its home in such swamps. In other places the reeds were quite sparse and a canoe could pass easily between the stems. Nearly everywhere the water was from 7 to 12 feet deep and always on the move, in baffling directions.

After a few days a certain amount of order began to appear out of the apparent confusion, leading to the deduction that the level of the water surface is highest at the eastern end, where the Chambesi River enters the area, rather lower at the open lake at the north-west corner, and lowest at the south-west

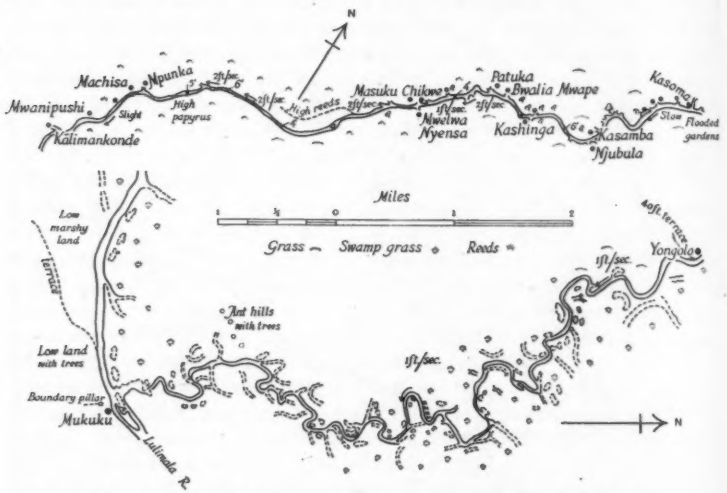


Fig. 2. Sections from the survey of drainage channels in Bangweulu swamps

corner whence all the water finally escapes. The actual differences of height between these three corners of the "lake" could not be determined, but calculations of various kinds based on meagre information gave the relative heights shown in Fig. 1. This map further shows that on entering the swamps the Chambesi water has a choice of at least three channels (if one is permitted to speak of a channel, where the bank is not dry land but thick papyrus growth) through which to escape if there is a gradient in that direction.

Perhaps the best way both to explain and to understand these vagaries is to consider a model of the whole system which we might construct somewhat as follows (Fig. 3). Let us take a triangular piece of carpet with a thick pile and put it on a triangular board. The board is placed on a level table but is supported by bricks so that the three corners are at slightly different levels. At the north-west corner we shave off all the pile for Lake Bangweulu; then, with a small hot poker we destroy the pile along certain lines for the channels and on certain small patches for the lagoons, and we thin it out in other areas by

plucking. Finally we place a large patch of sand for the Lunga Bank and higher ones for the small islands. Water is run in at the highest corner from a pipe which represents the Chambesi River, so that it finds it way along all the tiny channels we have provided. Some passes along the uppermost channel to fill the lake though it leaks badly through the pile, much of it passing round but not over the miniature Lunga Bank. If we want to flood that bank we block the southernmost channel with some of our waste pile, simulating floating papyrus, thus deflecting more water to the upper channel. If on the other hand we want to free the Lunga Bank of water, we guide our "floating papyrus" to that channel and free the more direct channel. In other words, we imitate the sloping surface of the real swamps by checking the flow of the water through the carpet pile while allowing enough to run directly through the channels to keep the "lake" filled and the miniature Luapula running out of it back into the western swamp area.

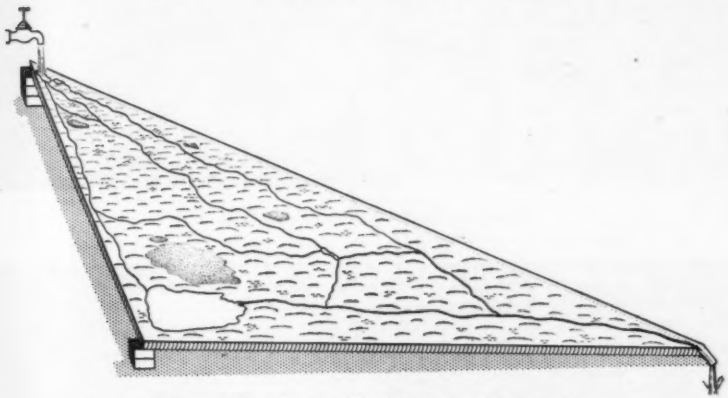


Fig. 3. Working model of Bangweulu swamps

Such a model certainly gives an explanation of the inclined surface of the real swamps; whether it gives the whole cause of the occasional flooding of the Lunga Bank can only be settled by investigations and careful surveys of the eastern end, but it is highly suggestive as to both the reason and the remedy. Neither time nor supplies permitted a visit to the eastern end. That the party did not make for this critical north-eastern corner at the start was entirely the fault of the writer, who committed the error so often denounced by Sherlock Holmes of beginning his investigation with a theory, namely, that flooding in a lake must be due to phenomena at the outlet end of it.

Now let us turn to Lake Nyasa which has indulged in such exasperating fluctuations of level over a period of years that it imposes the most serious hindrances on development of the territory. It is an old problem which has been discussed several times in this *Journal*.[1]

When Dr. Livingstone first discovered the way to Lake Nyasa up its outlet

[1] See, for example, F. E. Kanthack, "The fluctuations of Lake Nyasa," *Geogr. J.* 98 (1941) 20–33.

the Shire River, the lake was high and the river permitted navigation except where there were rapids. The lake level then gradually fell until, for a few years, the river was almost dry and no water left the lake. Fig. 4 shows the actual rise and fall of the level in recent years, both annual, due to the seasonal rainfall, and cyclical, due to the unknown cause. The graph is complete up to January of this year, thanks to Mr. Reginald Sharpe of Nyasaland who kindly supplied me with figures. Various theories have been propounded, of which for a time the sun-spot cycle of eleven or thirty-three years was the favourite. It is now known that we need not seek cosmic causes at all.

Let us again have recourse to a model, to see if we can produce a tiny lake which will do such curious things. For the lake we make a small basin of clay or plaster with an outlet, and we run water into it from a tap, reducing

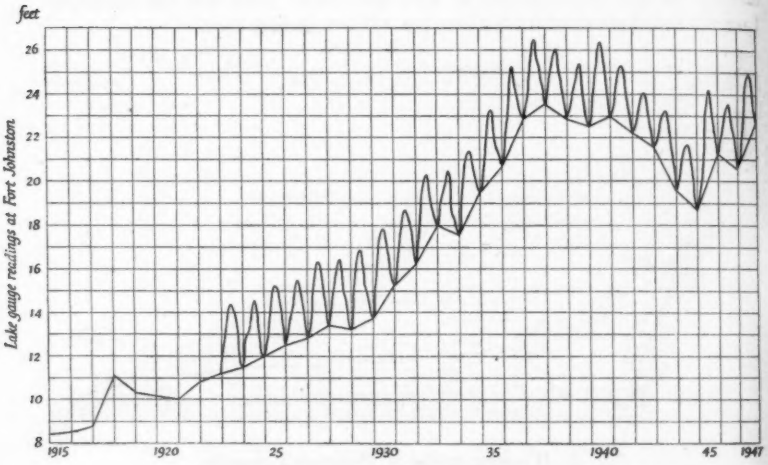


Fig. 4. Changes of level of Lake Nyasa, 1915–47

a year to a few minutes and varying the flow to imitate the wet season. The level of the water in the basin will rise and fall with the wet season flow in a more or less regular way, but it is impossible to make a long-term "cyclical" rise and fall by simply varying the supply of water reaching the lake unless we simulate a cyclical change of rainfall which does not in fact occur. On the other hand, if we take liberties with the outlet we can produce a cyclical rise and fall similar to that of the actual lake. Thus, if for a few miniature years we put sand in the outlet, the level of water in our basin successively rises until at some point the little stream flows over the sand barrier so fast that it erodes it away, even though we continue to add the same amount of sand. When the flow is weak and the lake level low, the steady addition of sand again builds up a barrier and the rise begins again.

So we must ask ourselves what conditions there may be in Africa which can in any way simulate our experiment and produce the same result on an enormous scale. There are two factors: the phenomenal rate of growth of

Native canoes, Lake Bangweulu

Typical sand river, Bechuanaland Protectorate

The Shire River at Fort Johnston, outlet to Lake Nyasa

Churchill Avenue, Fort Johnston

aquatic vegetation such as papyrus, and the tremendous floods in the rainy season which bring down silt from the mountains.

If we look at the map of the outlet river known as the Upper Shire we see that it has tributaries running into it from either side all the way down, and that these tributaries come from high hills and mountains. If our map is a recent one it also shows that the fall of the river between Fort Johnson and Liwonde, a distance of 50 miles, is very slight.

Let us start with a low lake, which means a weak flow of water over this sluggish stretch of 50 miles. Papyrus and other water vegetation encroach on the channel and even by themselves might ultimately start the cycle. But if we add the silt brought down into the upper Shire by cloudbursts over the mountains we have both factors at work. The silt raises the level of the water and the vegetation consolidates it. Each year the lake level rises in the wet season but discharges less over the obstructed channel. Finally no water runs out at all, as happened from about 1911 to 1928, and the lake level continues to rise. By 1933 the water level was beginning to overtake the rate of obstruction and to have a sensible flow, removing it year by year until by 1938 it had washed enough of it away to allow more water to flow out than the rainy season brought in. So the aggregate curve began to go down, until 1945. In that year and the two following years the rains were very heavy and the level began to rise again. This recent interruption to the falling curve is of great interest as showing how delicately balanced are the supply and the discharge even when the lake is high. The nature of the outlet has a good deal to do with this balance. On leaving the lake near the picturesque Fort Johnston, the upper Shire has a wide and deep channel till it reaches Lake Malombe where its rate of flow is checked and such silt as it contains is liable to be deposited (Fig. 5). This section was entirely blocked in the years 1911 to 1928 and Lake Malombe was dry. The channel issuing from Lake Malombe is narrower because it is constantly being invaded by silt brought down by its tributaries, especially the Nkazi. This section too was entirely blocked in these years. The total fall of level between the lake and the first rock-bar at Liwonde is slight; at present lake-level it is only about 6 feet in a distance of 50 miles, all of which is through alluvium. It is the combination of a low gradient, an alluvial soil, steep tributaries and the African climate assisting growth of aquatic vegetation which is responsible for the "cyclical" rise and fall. It is not a true cycle since it can be interrupted by climatic variations, as recent years have shown, and one can only say that with the present high level in the lake the tendency will be to fall for the next ten or twenty years.

However interesting this may appear as a large-scale instance of the processes of physical geography at work, it is a very serious matter indeed for Nyasaland. The lake itself should be a magnificent waterway for transport. That it is stormy and treacherous is true, but that would matter less if one could construct harbours. But with a rise of nearly 20 feet over a period of thirty years it is impossible to make harbour works since in a few years they are liable to be either high and dry or flooded out. The African shore-dwellers suffer too. For a few years they may be able to grow rice in the low-lying areas but then their paddy patches are either deep under the water or high above it. The same kind of difficulty arises in the flood plain of the

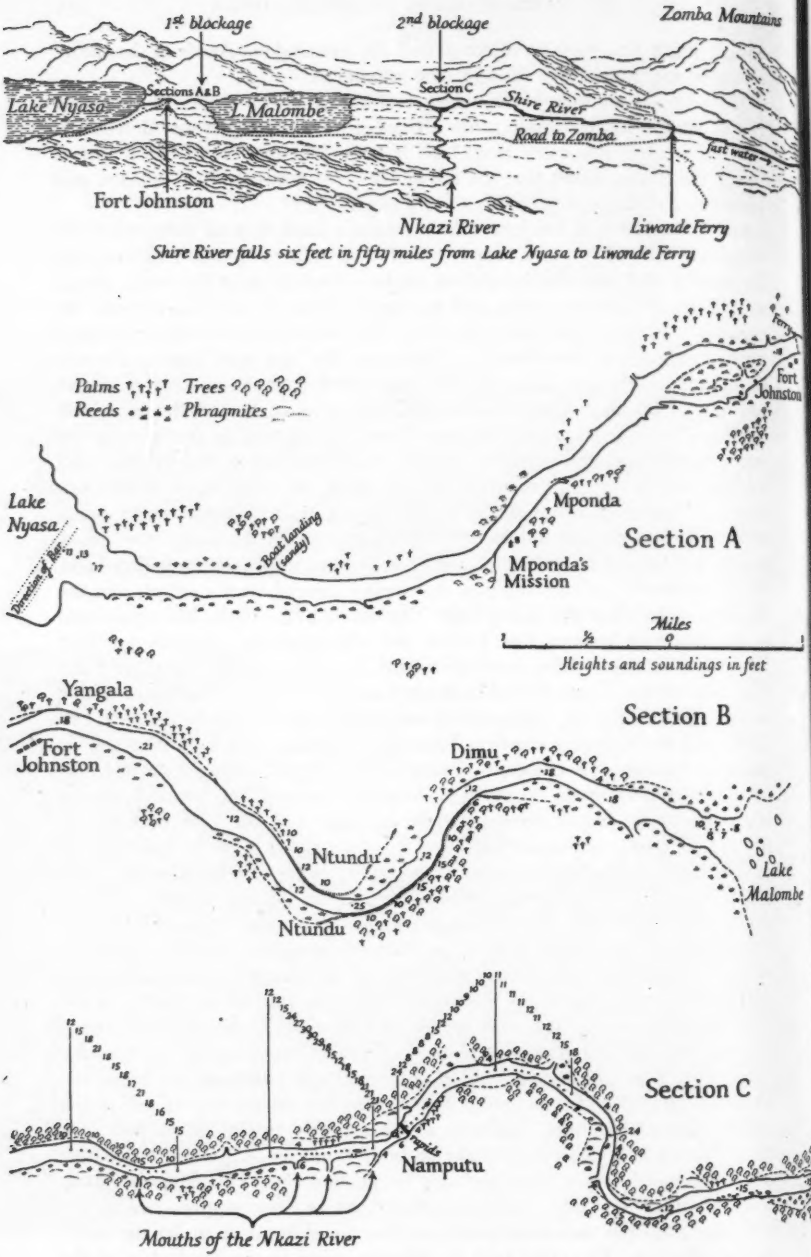


Fig. 5. Panoramic sketch and surveyed sections of upper Shire River

lower Shire, 120 miles south of the lake, where cotton used to be grown over wide areas until, after 1933, they began to be annually flooded out.

The remedy for this unhappy state of affairs is fairly obvious and has already been reported on by eminent engineers. It would consist of a regulating barrage on the upper Shire near the outlet which if suitably designed might eventually serve no less than three purposes: it would stabilize the level of the lake within a range of 3 or 4 feet and permit harbour-works and permanent agriculture along its shore; it would keep the lower Shire at a mean flow allowing river transport of bulk goods such as cotton and maize; it would also control the river at a rate of discharge that could be used for hydro-electric power below the Murchison Rapids and then distributed for such irrigation as was desirable. These things are for the future and will of course have to be studied still further.

These examples of problems in hydrology have been selected not only because of their interest to geographers but also because they illustrate one of Central Africa's needs, namely, reconnaissance surveys to establish the facts. In the cases mentioned this would mean a field party to do some levelling, measure discharges, set up gauges and map tributaries, work which can rarely be done by the resident technical officers, hindered as they are by routine duties. Many of these surveys could be done by junior geographers in vacation periods under direction by a senior person. The Society in consultation with the Colonial Office is doing what it can to initiate Long Vacation expeditions to various parts of Africa for this sort of purpose and in the furtherance of geography as a field study.

DISCUSSION

Before the paper the CHAIRMAN (Sir HARRY LINDSAY) said: The first announcement I have to make is that it is a record for the Royal Geographical Society, the Geographical Association and the Institute of British Geographers to have got together and cooperated in this joint meeting. It is not a record that Professor Debenham has come to speak to us because he was with us some time back, and please do not think I am going to introduce him—there is no need for that. But there is a piece of news about him which I feel sure will interest you all, that the Secretary of State for the Colonies has recently nominated Professor Debenham to the Colonial Social Science Research Council under the chairmanship of Sir Alexander Carr-Saunders.

The subject of Professor Debenham's talk this afternoon is "The water resources of Central Africa." I know a chairman ought to make himself as brief as possible, but I cannot refrain from telling you what a great impression it made on my mind, when I was in Kenya a little before the last war, to see the soil erosion there and the efforts made by contour ploughing and so on to redeem the land from destruction—redemption was what it really amounted to. Secondly, longer back, when I was in India, I remember how sometimes we were visited by a particularly charming body of men known as the Pumping and Boring Establishment. When we saw the water coming up we knew that their visit would be of the greatest help to the district. Without further ado, I ask Professor Debenham to give us his address.

Professor Debenham then gave the address printed above.

Mr. L. BROOKS: Sir Harry Lindsay had, unfortunately, to leave. He asked me to close the meeting, and I do not think I can do that better than by asking

Professor Austin Miller to thank Professor Debenham. As Sir Harry told you, this is a joint meeting. Professor Austin Miller is a very distinguished member of all three societies: he is President of the Institute of British Geographers; he is a valued member of the Council of the Royal Geographical Society; he was until yesterday morning a member of the Council of the Geographical Association, and I hope it will not be long before he becomes a member again.

Professor A. AUSTIN MILLER: Members of the three Societies—the body I represent, the Institute of British Geographers, is the baby of the three. If the Royal Geographical Society is the mother, we, if not of the third generation, are very much the younger brother. We are only fourteen years old, and we feel very privileged that we have been invited here and have been allowed to move this vote of thanks to Professor Debenham. It is most appropriate that he should be addressing this meeting because he represents all that is best in the aims and objects of those three societies. Round this Hall are written in gold letters the names of the great explorers, which shows you the tradition in which the Royal Geographical Society was founded. Professor Debenham started his geographer's career as an explorer with Scott in the Antarctic just before the 1914–18 War, and he has not stopped exploring yet. He is also a scientific explorer who brings to bear the techniques of the modern sciences in the secondary exploration of the countries that he visits. But furthermore we are all of us concerned in education and it is particularly, perhaps, as an educationalist that we owe Professor Debenham so great a debt. I do not suppose that he would think of himself as an educationalist, but he is, after all, the head of the great School of Geography at Cambridge and he influenced that University many years ago to build a new department, to found a Chair and to give full recognition to geography: no mean task! He stands in *loco parentis* to one of the largest departments which is held in great esteem by us all and especially by its own alumni. And many of us too who are not alumni of Cambridge feel towards Professor Debenham the affection and respect that children are supposed to feel, but do not always feel, for their fathers. You will have realized from the way in which he has dealt with us this evening, and his happy and entertaining but at the same time serious exposition of his subject, how he is naturally held in esteem and affection by all those who come into contact with him. It is a great pleasure as well as a privilege to propose the vote of thanks.

Professor DEBENHAM: Thank you all very much indeed. I do not know what I am going to do with so large a family, but it is a real pleasure to speak to such a large audience and to see before me so many faces I know.

Professor H. J. FLEURE: On behalf of the visitors, I have the honour of expressing thanks to the Royal Geographical Society. We are very happy as the younger generation to come home, and in this Hall we have listened to a valuable scientific lecture which has demonstrated magnificently the functions of geography in the present-day world. We thank you Mr. Brooks, as a member of the Geographical Association and as a new Honorary Secretary of the Royal Geographical Society, and we ask you to convey our thanks to the Council of that Society.

CLIMATE AND WEATHER IN MODERN NAVAL WARFARE

COMMANDER C. R. BURGESS, O.B.E., R.N.

Afternoon Meeting of the Society, 17 February 1947

THE PROFESSIONAL SAILOR is necessarily a student of many subjects that at first one might hardly suspect of interesting him. One of the more obvious is Geography, for he is essentially a traveller and like all sensible travellers he reads about the country he is going to visit for the first time. He arms himself with some knowledge of the history, customs, occupations—and, in particular, the climate of the country; for not only does climate affect all the other aspects but it may necessitate special precautions or arrangements with regard to the ship and its crew, as also may the climates of the regions passed through. And if the visit is made not as a friend but as an enemy, a knowledge of weather likely to affect operations becomes of first importance. Never was this truer than to-day when the success of an attack depends so largely upon the efficient use of the aircraft that extend the eyes and the arms of the Fleet for several hundred miles.

During the days of sail, ships were entirely dependent upon one element of weather, namely wind, for without it they could not proceed, except for short distances by the laborious method of towing by boats or kedging; and ships could not be fought efficiently unless they could be manoeuvred under way, as some of Nelson's and Hawke's opponents learnt to their cost. An admiral might be in sight of his enemy for two or three days, jockeying for the windward position before joining battle at a range of under 1 mile, and forecasts of wind, gales and calms would have been of great value.

In these days of screw-driven, steel ships one might think that weather is of less concern than it was. To a limited extent this is true in that the well-found, ocean-going ship can stand up to any normal gale and will not founder in deep water or be driven ashore. But modern battles are fought at ranges of anything up to 300 miles or more, with aircraft that cannot function efficiently if their base ship is pitching or rolling badly, if cloud height is very low or ice accretion likely to be serious; nor can they land on their carrier in fog. Further, while fair weather is desirable for operating a fleet, it may be disastrous to be caught out in the open with clear skies and good visibility by enemy aircraft. Landing operations must usually be carried out on open beaches on a given day, and the large forces employed entail the landing of vast quantities of equipment and stores perhaps for several days before a harbour becomes available. In earlier times, landing operations were on a comparatively small scale and were seldom opposed with any strength; the commander-in-chief could afford to wait until the weather was suitable without fear of being harassed by air and submarine attacks, even if the enemy had apprehended his intention. To-day climate and weather are of first importance to most naval operations.

The value of climatic information at the planning stage

Operational planning requirements usually come under two main headings. First, a comparison of the relative merits of the different times of the year for some specific operation, and of the different locations for it. For example, in the recent war a landing on the coast of Normandy was less hazardous than one to westward of the Cherbourg peninsula because it afforded protection from the not infrequent Atlantic swell. Secondly, a concise description of the climate and weather as it affects the operation in the actual locality under consideration, at a stated time of year.

At an early stage in the war it was forcibly brought home to us that climate and weather are inseparable. The elements of climate which are usually the most important to the Navy are prevailing winds; frequency of gales, squalls and fog; low cloud and surf. Rainfall is only of interest if it is so heavy that it reduces visibility. It is then usually accompanied by a considerable lowering of the base of low cloud. For landing operations rainfall is important if it falls in sufficient quantity to render the country, especially beach exits, unsuitable for transport or airfields unusable.

In naval planning it is customary to give an opinion even when there is no precise information on which to base it. With a sound meteorological background the climatologist should be able to estimate probable conditions in any part of the world. He may be proved wrong, but the planner or Force Commander requires an opinion and it is the naval climatologist's duty to furnish it. The following are examples of questions of this kind that required an answer during the late war:

(1) When and why is the weather of the doldrums sometimes squally with heavy and continuous rain over a large area and winds approaching gale force, when at other times it is fair? What is the geographical location of the doldrums belt throughout the year? Is it narrow and well defined or is it broad and indefinite, and what governs its width?

(2) What is the rule for estimating the height, length and period of waves in a storm area? At what rate do swell waves decay? In what way does shallow water alter the shape and direction of waves? What technique should the meteorological officer use to forecast surf on beaches?

(3) How far north could our north Russian convoys go without running into ice? Can the varying position of the ice edge be correlated with any weather element which would give some indication of development in the near future. In other words, what is the technique, if there is one, for forecasting the position of the ice edge?

I propose now to give some account of what was learnt about these three subjects.

The climate and weather of the doldrums

The subtropical and trade-wind regions comprise nearly half of all the oceanic regions of the world, and this vast area enjoys fair weather for most of the year. Gales are infrequent, fog and low visibility are confined to a few small localities, and ceilings below 1500 feet are seldom met except on the fringes of the area. Between the northern and southern trade-wind regions lie the doldrums which have a reputation for calms, or light and variable winds,

and rain squalls. In days of peace these are of little significance to ships on passage across the equator.

During the early part of the war, however, it was realized that from the operational point of view there was more in doldrum weather than just rain squalls. At times the rain was continuous and the cloud so low that enemy surface raiders or submarines could rendezvous with their store vessel in comparatively calm conditions with a better chance of remaining undetected than they would in several hundred miles on either side of this belt. There were several occasions during the naval war in the Pacific, and again in the attack on Ceylon (5 April 1942), when a large advantage was gained by the fleet that made use of bad weather in or near the doldrums. Moreover, some of the aircraft on passage from the United States via South America and tropical West Africa (north of the equator) were lost, and others reported such weather as: "Continuous thunderstorms, icing conditions about 14,000 feet . . ."; or "Slight snow two-thirds of the way over at 13,000 feet . . . conditions very bad after first 900 miles. Heavy rain and icing at 18,000 feet. . . ."

As a result of our own studies, especially those of a climatic nature carried out by Lieutenant Commander G. H. T. Kimble, R.N.V.R. (now Professor of Geography at McGill University, Montreal), and the work of meteorologists in India, Australia, New Zealand, the Philippines, the U.S.A. and elsewhere, we have learnt a good deal about doldrum weather though no one can yet claim to have devised a sound forecasting technique comparable with that in use in higher latitudes. The first big difficulty with which one is confronted is that the wind bears little relation to the orientation of and distance between the isobars within 10° or so of the equator.

The equatorial low-pressure trough, the doldrums, and the thermal equator where sea temperatures are highest are usually to be found in the same vicinity. The region is sometimes known as the "inter-tropical convergence zone" because it is the zone towards which the winds of the two hemispheres converge. On the equatorial side of the subtropical Highs there is little change of air mass as a rule, and bad weather (apart from tropical storms) is primarily caused by the ascent of air due either to convection or to the convergence of two air masses of similar densities. Convergence takes place when more air flows horizontally into a given area than leaves it, thus forcing the excess air to ascend. In either case the ascent results in condensation and the formation of cloud and rain if the air is sufficiently moist and unstable.

Where a layer of relatively warm and dry air exists aloft, as in the trade winds, due to subsidence in the subtropical High, convection cells are unable to penetrate this layer. Hence the height to which the air can rise and water vapour be distributed is limited by the base of the inversion, and the weather of this zone is characteristically fair. As the air gets farther away from the subtropical High and closer to the thermal equator, the inversion becomes higher and less well marked while the surface temperature rises. When the air arrives within 100 to 200 miles of the inter-tropical convergence zone, there is normally little trace of an inversion, and convectional activity due to surface heating over the warmer water spreads to great heights, thereby producing a very deep layer of air of high relative humidity. Under these conditions very

little cause is needed to bring about huge-scale convection in the form of heavy showers and thunderstorms. Over the land the necessary trigger action may be provided by orographic lifting, as is the case on the west coasts of India and Burma during the season of the south-west monsoon; or by the rise of temperature due to solar radiation which reaches a maximum about the middle of the day. Over the open sea, where the diurnal range of temperature is seldom more than 1° F. in twenty-four hours, such diurnal variation of weather as is observed (the "Meteor" records show that more rain falls at night than by day) would seem to arise mostly from nocturnal cooling aloft consequent upon radiation from clouds and water vapour. There is evidence to show that when the trade wind is blowing harder than usual, weather in the doldrums deteriorates because the warming-up of the surface layers is relatively more rapid and the air becomes more than usually unstable when it reaches the thermal equator. But all this does not account for belts of bad weather in which cloud is very low and rain is continuous.

In the absence of much frontal activity in low latitudes, it seems probable that the most usual cause of a bad weather belt is convergence. This however is difficult to detect due to an almost invariable lack of reliable observations, especially over the sea, and it is even more difficult to forecast. In this connection it is worth noting that weather in the region of the doldrums is often related to the distribution of pressure in higher latitudes. The controlling subtropical anticyclones are not permanent fixtures. The pressure gradient, or rate of change of pressure with distance, is seldom the same for more than about three days at a time, if indeed for as long as that. The main centre of the High shown on climatic charts is usually to be found on the eastern sides of the Pacific and North Atlantic, but it varies a good deal in both location and intensity, especially in winter. Moreover subsidiary Highs move round the southern hemisphere from west to east, and out from the eastern sides of the North American and Asiatic continents in winter, as if to reinforce the main Highs.

In low latitudes, where pressures mean little unless a tropical storm is in the vicinity and a synoptic chart cannot be analysed from surface observations as in higher latitudes, a network of upper-air observations seems to offer the only hope of improving the technique of forecasting and of learning the causes of large-scale weather phenomena; but this dream of meteorologists is unlikely to materialize for some years because of the high cost of installing, operating and maintaining efficient radio and radar instruments. However, although much of the problem remains to be solved, the knowledge acquired during the last six years or so has much improved the chances of a good forecast.

I have now tried to indicate broadly the problem with which meteorologists have been faced in the doldrums, which must be of some importance to geographers, and have sketched some of the lines along which thought is being directed. There are two other large effects, those due to topography and radiation, which together produce what is generally understood as "local weather" and are often the predominant feature of weather in the doldrums. Investigations of these effects have been made in the Naval Meteorological

Branch, Admiralty, and are still in progress, but I have not time to go into so large a subject just now.[1]

Sea waves, swell and surf

From 1941 onwards the Director of the Naval Meteorological Service, Admiralty, was asked for information about frequency of surf above certain heights on various beaches at which landings were being planned.

At that time our knowledge of the life-cycle of a wave from the time it begins as little more than a ripple to the time it breaks upon a beach, possibly thousands of miles away, was small. The earlier enquiries we received could be answered satisfactorily because they were simple. For example, it might be seen from the climatic charts that part of the locality was exposed to a direction from which fresh or strong onshore winds prevailed with such high frequency that landing on such beaches would be impracticable and a more sheltered area would have to be chosen.

In the spring of 1942 we were told that American and British troops would land in North Africa in November and we were asked what surf conditions were to be expected. We pointed out that the weather usually breaks in the Mediterranean and off Morocco in October and November and these months are likely to include several stormy days; that, in addition, the Atlantic coast of Morocco is famed for the heavy surf that pounds its beaches throughout the year though most often in winter, and that there are no alternative sheltered beaches. Our rough estimate, together with the rather unreliable statistics available for these shores, showed that the chances of a calm landing were appreciably smaller in November than in October, in fact about 3 in 5, and that only from May to September was the prospect reasonably good. The American general who was to command the troops on the Atlantic coast said that the landing could not be brought off before November and it would indeed be a bitter disappointment to be drowned in Africa before having a chance of fighting the Japanese in the Pacific.

It was then evident that we must very quickly learn how to forecast the surf, at any rate accurately enough to ensure that transports and landing craft would not get within sight from the coast to find that landing operations were impossible. We made enquiries of people in America, including Pan-American Airways who had had experience of landing flying-boats in the Azores, but no one seemed to know how forecasts might be made. Instructor Commander Suthons, the technical adviser to the Director of the Naval Meteorological Service, concentrated on the problem. The data available from ships was mostly qualitative, and much of it was unreliable because many observers had not differentiated between sea, which is the wave disturbance caused by the prevailing wind, and swell which is a wave system *not* caused by the prevailing wind but generated in a storm outside the area, perhaps several days previously in an area 2000 miles away. Commander Suthons produced a guide to forecasting swell which was made available to Naval Meteorological Officers

[1] The result of one of the investigations into local weather in the tropics carried out by the Director of the Naval Meteorological Service has been published in G. H. T. Kimble, "Tropical land and sea breezes with special reference to the East Indies," *Bull. Amer. Met. Soc.*, 27 (1946) 99–113.

shortly before the Fleet sailed for North Africa. Despite the difficulties of completing the task at such short notice, the contents of this guide still seem to be substantially correct, though knowledge of the subject has since been greatly enlarged by the combined efforts of many workers including Professor Sverdrup of the California Institute of Technology, Commander Suthons himself, and the staffs of the Oceanographical and the Scientific and Research Departments of the Admiralty.

I am not competent to discuss the whole complexity of ocean waves, nor would it be appropriate to do so here, but I believe it would be of interest to you if I were to outline the general principles of the subject.

When the wind blows over the sea, trains of waves are started off by the impact on the sea surface of downward moving eddies in the air current. As a result of observation and calculation it is now known with reasonable accuracy what the average dimensions of waves will become after they have been acted upon by a given wind for various lengths of time. There is another factor that has to be considered, namely the fetch, which is the distance over which the wind is able to act upon the water from nearly the same direction. It will be evident that if the wind is blowing off-shore it cannot raise such big waves a mile from the shore as it can at 10 miles, no matter how long it may blow. In practice the fetch is determined most often from the length of the area over which the wind can be seen, on a synoptic chart, to be blowing in nearly the same direction; this distance is seldom great owing to the changing distribution of pressure, especially near the centre of a depression where the change of wind direction is considerable over a comparatively short distance.

Waves generated in this way accumulate an immense store of energy when produced by a gale blowing for twenty-four hours or more; this enables them to travel a long way after the wind ceases to blow over them provided they meet no opposing winds to reduce their height by an appreciable amount or, in effect, to flatten them out. The next part of the problem is to determine the speed of travel of what are by then *swell* waves and the rate at which they decay.

If a brick is dropped into a pond, waves radiate in all directions from the place of impact and it is easy to see that the outermost wave dies and is replaced by the next wave behind it, which in turn dies and gives place to its successor. In this way the swell waves travel—as it were, losing one for every two steps forward; in fact the swell or group of waves as a whole travels at half the speed of the individual waves. Since the speed of the waves does not fall far short of that of the wind that caused them, provided duration of blow and fetch are considerable we can obtain an approximation of the time at which the swell will arrive at a distant point by assuming the speed of travel to be one-half the wind speed in the generating area.

This account is necessarily simplified and gives the impression that there is only one set of waves whereas actually there is a large number of waves of different lengths and heights in and about the storm area. There is nevertheless one predominant one that has been acted upon by the wind for longer than the others.

The air offers the same kind of resistance to waves as to other moving bodies, and the movement of the particles of water in relation to each other

due to wave action is a further source of friction. Both of these effects require expenditure of energy, which results in the waves being gradually reduced in height. This reduction of height is more rapid with short waves than with long, and with steep waves than with low ones. It follows that short waves soon become inappreciable, and since they travel slowly they do not travel far from the generating area. In course of time the longer waves become increasingly in evidence and assume the more easily recognizable, long-crested shape. For the same reason the height of all waves decreases at a diminishing rate, and it is an approximate rule that a wave loses half its height every time it travels a distance in miles equivalent to its wave length in feet. For example, a wave 600 feet long and 20 feet in height will be reduced to 10 feet in height after travelling 600 miles, to 5 feet after 1200 miles, and so on. A following wind will result, as one would expect, in a slower rate of decrease in height whereas a head wind will hasten the decay.

The next step is to determine changes in the dimensions of waves as they enter shallow water, and hence the height of surf on the beaches. The rotary movement of the water particles produced by wave action extends to greater depths for long waves than for short ones; in fact the length of a wave varies with this depth. When the depth of water is reduced to half the wave length, the rotary movement begins to be restricted and further reduction in depth progressively shortens the wave length, the long waves being affected sooner than the short ones. As the length of the waves is reduced, so also is their speed, though the period, or interval in time between the passage of successive crests past a fixed point, remains the same. Thus the waves become, as it were, telescoped. Since the height remains much the same, at any rate in the first instance, the waves become steeper and the shorter ones will foam at the crest if the angle between the front and rear-slopes becomes less than 120°. When the ratio, height of wave to depth of water, becomes about 2 to 3 the wave breaks; for example a 10-foot wave will break in about 15 feet of water. The height of very long waves increases just before they break, and a wave 1000 feet long, the height of which is not more than 3 feet in deep water, will break as a 5-foot wave. Operationally this is vital, for a 3-foot surf is surmountable though awkward, whereas a 5-foot surf reduces the rate of landing troops and stores very considerably. It was only realized a few years ago that the locally famous rollers of Saint Helena and Ascension islands in the South Atlantic are swell waves produced in a storm in the North Atlantic east of Newfoundland about eight days previously. They are so long and low when they approach the islands that they are not noticeable in a ship in deep water, but as the water becomes shallow they increase in height, ending their journey as surf up to 8 feet high, having appeared literally "out of the blue." The reduction of speed and wave length on entering shallow water accounts for the fact that waves approaching a coast obliquely wheel round so that they finally break with their crests aligned nearly parallel to the shore.

The following examples illustrate the efficacy of the technique now available for forecasting the time of arrival of swell and the height of waves off beaches.

A little over three years ago it was decided to send an officer from the Admiralty to Casablanca to obtain some reliable observations of swell on Moroccan coasts, divorced from sea and wind, which would provide data

regarding the speed of travel of swell and the effect of shoaling water. It was desirable to give at least three and preferably four days' warning of the day on which a swell would arrive since the U.S. Navy, with their usual wholehearted cooperation, had undertaken to provide a ship to take observations at sea and an aircraft to take a series of special timed photographs; and a French naval team were prepared to take observations of the waves as they finally approached the beach. There were only two periods of swell during a stay of three and a half weeks and both were forecast three or four days ahead. No observations could be made on the first occasion because of fog, but on the second all plans

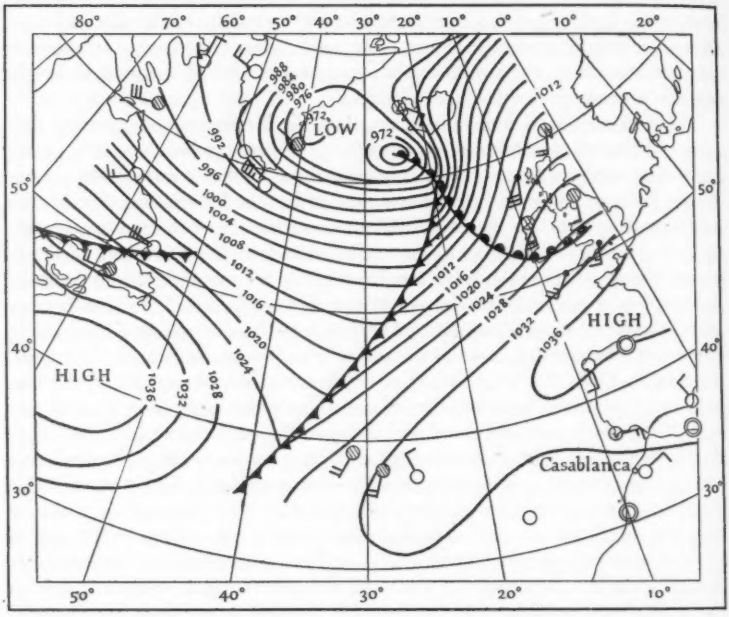


Fig. 1. Synoptic chart for 0100 G.M.T., 18 January 1944, from which swell on Moroccan coast was forecast

were made three and a half days before the arrival of the swell, despite an assurance only the day before from the local authorities that there would be none. On both occasions however the swell arrived a little sooner than was expected, thus illustrating what had been suspected, that the speed and length of the swell increases somewhat with distance from the storm area; moreover it was impossible with the meteorological information available to say just when, within about twelve hours, the waves were generated. Fig. 1 shows the synoptic situation on which the second forecast of swell was made. The main features for which the forecaster must look are isobars aligned nearly parallel to the beach with which he is concerned, over a distance of about 500 miles or more.

My second example is taken from the Normandy beaches, where considerable damage was done and unloading much delayed by an almost unprecedented north-easterly gale less than a fortnight after D-day. The actual observations made by a British and a U.S. ship show most satisfactory agreement with the computed figures.[1]

Sea ice in the Baltic Sea and on northern convoy routes

The distribution and extent of sea ice is so closely related to weather that it became a wartime responsibility of the Director of the Naval Meteorological Service to advise all Admiralty departments concerned, as well as the R.A.F. and the Ministry of War Transport, of the current ice situation in European and arctic waters and of probable developments in the immediate future.

Baltic Sea.—During the war our interests in the ice situation in the Baltic were partly indirect. Here are three examples:

(1) Germany relied on a considerable supply of high-quality iron ore from northern Sweden. The easiest way to transport the ore was by ship from Lulea at the northern end of the Gulf of Bothnia, but this port is inaccessible owing to ice from late December, on average, until early May. As the ice spread farther south, Umea, Hernosand, Gävle and other loading ports in the Gulf undertook the task until they in their turn were forced to close. Hence it was a concern of the Naval Intelligence Department to know when these various ports were likely to be closed or opened. Little of this information could be obtained from Sweden, at any rate during the earlier years of the war.

(2) In a severe winter such as occurs on average about twice in ten years, the German Baltic ports become closed and so do the exits to the North Sea and the Kiel Canal. During the war this resulted in a last-minute rush of naval and merchant ships from the Baltic to the North Sea ports, providing targets for submarines and aircraft.

(3) Mine laying was carried out to a considerable extent in the vicinity of the Belts and the German Baltic ports, and the mines could not be laid or swept when there was much ice. It was of some importance for those who planned mine-laying operations to know to what extent navigation was possible, whether icebreakers were being used, and when the ice was breaking up or minesweeping operations were likely to be resumed.

The solution of the ice problem in the Baltic was not as difficult as it may sound. We were in this respect fortunate in having a cold winter in 1939–40 when we received many reports of the ice situation from Denmark, Holland and the Baltic States. These were correlated with the general trend of air temperature over the Baltic and north Germany, and in the two following winters we were able, with the aid of some known or estimated temperatures and occasional reports from our aircraft, to assess the situation with fair

[1] For further study on this subject the following papers are the most up-to-date: C. T. Suthons, "The forecasting of sea and swell waves"; H. U. Sverdrup, "Wind waves and swell—principles in forecasting"; G. E. R. Deacon, "Ocean waves and swell," *Occasional Papers, Challenger Society*, 1 (1946) 12 pp. A copy of Commander Suthons' paper is in the Society's Library, by courtesy of the Admiralty Meteorological Service, and may be consulted there. Professor Sverdrup's paper is the property of the United States Navy Department and is not yet available.

success. As a rule it becomes impracticable to keep open the Baltic ports about four weeks after the local average air temperature has fallen below 25° F., but determined efforts with modern icebreakers may postpone the date.

Greenland and Barents Seas.—Ice in these seas was of more direct operational significance than in the Baltic for it affected the routeing of our ships bound to and from north Russia, often via Iceland. It was desirable to keep as far as possible from enemy aerodromes in northern Norway, and to evade lurking submarines. The best chance of achieving the latter lay in taking ships through ice, but we soon learnt that this procedure was not advisable because the thin-plated escorts were easily damaged and ice prevented the convoy being manoeuvred as a whole.

It was in the region of Bear Island that the trouble began. From December until early June the pack ice normally extends close to or beyond Bear Island, and in April, when ice conditions are about their worst, it may be necessary to route ships nearly 100 miles to the southward ; that is to say, only 150 miles or so from the Norwegian coast. In a mild season such as 1945, however, there was a passage of nearly 50 miles in April between Bear Island and the ice edge to the northward, judging by sea temperatures recorded off the south of the island. Information of this nature was of value in that the convoy could be routed farther from Norway, with a better chance of evading U-boats.

Some time ago we heard an excellent lecture by Air Chief Marshal Sir Philip Joubert and Lieutenant Commander Glen,[1] mostly about air reconnaissance in 1942 along the convoy route from Iceland to north Russia and between Jan Mayen, Spitsbergen and Bear Island. Largely as a result of these reconnaissances the ice edge was probably known more accurately during this unusually bad season than in any previous year. In the later years of the war we had practically no air reconnaissances to tell us the ice position except between Iceland and Jan Mayen, and we had to depend upon such sea temperatures as were reported by H.M. Ships when on passage and daily reports of air temperatures from Jan Mayen, Spitsbergen and north Russia. Prevailing winds in the vicinity of Bear Island, deduced from daily synoptic charts, were also recorded since a persistent wind direction has a considerable bearing on the drift of the pack ice.

Iceland.—As is well known, pack ice and bergs are carried down the east coast of Greenland through the Denmark Strait. From mid-August to November or December there is usually only a little ice in the strait and navigation is then restricted more by darkness than by the amount of ice. During the rest of the year, and especially from March to June, the greater part of the strait is covered though the ice seldom encroaches within the 100-fathom line, which lies about 40 miles off the north-west coast of Iceland. Before the war fishermen regarded the 100-fathom line as being almost inviolable and nicknamed it the "Hindenburg Line." There is indeed good reason for this for the boundary between the northward setting, mild Irminger current and the cold East Greenland current is usually roughly coincident with the 100 fathom line. Sometimes, however, ice crosses the line and comes within sight from the Icelandic coast; at times it reaches the coast; occasionally (about twice in ten

[1] "High latitude flying by Coastal Command in support of convoys to north Russia," *Geogr. J.* 108 (1946) 1–23.

years) it spreads right along the north coast and even round the north-east corner and down the east coast.

It was a matter of importance to the naval Commander-in-Chief and the Admiral Commanding in Iceland to know how much sea room there was in the Denmark Strait for a German raider to attempt to pass through. You may remember that the German battleship *Bismarck* and an attendant heavy cruiser were first sighted by our patrolling cruisers in April 1941 when

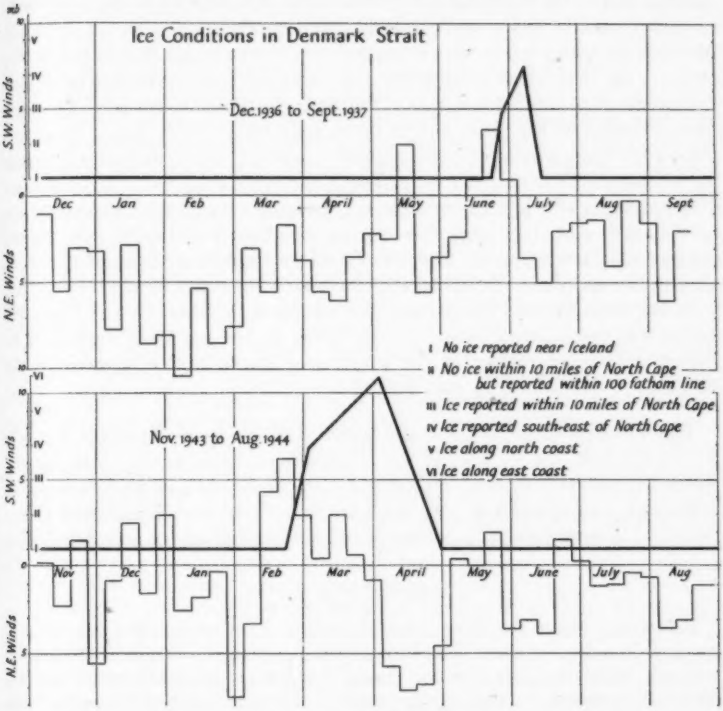


Fig. 2. Ice conditions off northern and eastern coasts of Iceland (heavy line) in relation to winds in Denmark Strait (fine line) in 1936–37 and 1943–44

southward bound north-west of Iceland. Ice along the north coast meant that our own ships could not pass round the west and north coasts from Reykjavík but must go southabout if bound for the north-eastward. It was evident that we had to do what we could to enable a forecast to be given of these unusual conditions. We tried correlating the encroachment of ice with winds off north-east Greenland, because stronger winds than usual mean a stronger current which might be expected to carry more than the usual amount of polar ice southward. We correlated ice conditions with air temperatures; but this also was unsuccessful, as is more understandable to us now, for much of the

ice that reaches Iceland is heavy pack ice which is probably several months old. We tried one or two other ideas as well, and eventually an officer was given a fortnight to do nothing but look for the answer. There seems very little doubt that he found it.

The prevailing wind off the east coast of Greenland is north-easterly, parallel to the shore, and this remarkably persistent wind is largely responsible for the East Greenland current. At times an anticyclone is established between Iceland and Norway and the Greenland anticyclone recedes to the north-west or disappears, so that south-westerly winds prevail in the Denmark Strait. Records for many years were examined and it was found that not only was every occasion of ice enveloping the north Icelandic coast preceded by at least two weeks of south-westerly winds, but such a period of south-westerly winds was invariable followed by reports of pack ice off Iceland. Fig. 2 illustrates two of the years which were investigated, including what was probably one of the worst periods in recent history, March and April 1944. On this occasion we had a warning of what was coming, for sea temperatures were unusually low to the north-east of Iceland, showing that this branch of the East Greenland current was far more active than usual, and we accordingly forecast an extension of the ice edge. We lacked the courage of our convictions however, not realizing then that the prevalence of south-westerly winds in the Denmark Strait was the primary cause, and we failed to forecast what proved to be almost a record extension of ice: at the end of March it even blocked the entrance to Seydisfiord in east Iceland.[1]

I am grateful for the facilities and advice given me by my Director, Captain L. G. Garbett, C.B.E., R.N., in the preparation of this paper; also for the many helpful comments of Professor G. H. T. Kimble, as well as those of Instructor Commander C. T. Suthons, B.A., R.N., and Lieutenant Commander J. Langworthy, R.N., of the Naval Meteorological Branch, Admiralty.

DISCUSSION

Before the paper the CHAIRMAN (Professor A. A. MILLER) said: To-day we have another of these interesting papers springing from the scientific research which is being, or has been, undertaken in the Service departments in response to the urgent needs of war. A variety of aspects have been ventilated in this Society—beach formations and slopes, aerial photographic survey, and so on, and while we hope that geographers have been useful in doing some of this work, we recognize the debt we owe to the officers in the Services who have undertaken the work. We appreciate that geographical knowledge has been increased very considerably by the intensive if often rather urgent and hurried work that has had to be undertaken in planning operations.

To-night we have a paper on "Climate and weather in naval warfare" by Commander Burgess of the Naval Meteorological Branch of the Admiralty who was in charge of climatological planning during the war. Those who attended the lecture by Air Marshal Sir Philip Joubert and Lieutenant

[1] Further details of this investigation have been published in an Admiralty Hydrographic Department report, H.D. 421, a copy of which is in the Society's Library and may be consulted there.

Commander Glen or have read the account in the *Journal* will be interested to know that on Commander Burgess fell the responsibility of organizing the mapping and reporting of the ice conditions for the arctic convoys. He will no doubt mention this in his talk to-night, among other aspects of planning for naval operations.

Commander Burgess then read the paper printed above, and a discussion followed.

The CHAIRMAN: We have heard from Commander Burgess a number of examples of the problems with which he was faced, and we have heard how he and his Branch tackled those problems and produced answers. Is it not a pity that the advice of experts is not similarly asked in times of peace and applied to peace-time problems of equal urgency? Meteorologists have already justified their existence, but climatologists trained to take the long-range view have hardly yet had a chance to do so. Our American friends are more aware of the advantages of technical and scientific advice, and they employ full-time climatologists in a great number of State departments—weather bureaus, soil conservation service, forest and range experimental stations, and so forth. If our national planners employed climatologists they might learn that the risk of an invasion by polar continental air is not to be lightly taken in any year. Had a climatological service been in existence and able to give attention to the problem in the same way as the Naval climatological branch during the war, the saving to the country in this last fortnight would have paid their salaries for two thousand years.

Captain L. G. GARBETT (Director, Naval Meteorological Service, Admiralty): I have listened to this lecture with particular interest because it was my responsibility during the war to supply the Navy with all its meteorological needs, and I was indeed fortunate to have on my staff Commander Burgess who is an encyclopaedia in matters connected with climate. In his opening remarks he said that the sailor was a student of many subjects and that one of those subjects was geography. May I add that the geographer is a student of many subjects one of which is meteorology? During the war we had in the Naval Meteorological Service many geographers who became first-class meteorologists; amongst them I might mention George Kimble, a Fellow of the Society who has already been referred to by Commander Burgess.

Of the many problems with which we were confronted the lecturer has mentioned only three, all of which were important from the operational point of view. Take first the movement and limit of the bad weather belt in the subtropical zone. A fleet of French and British ships were working in that vicinity during the war and got into very bad weather and were not able to carry out their operations. The meteorological officer of the aircraft carrier advised the Captain that if the line of advance of the fleet was moved a distance of about 30 miles to the southward he would get fine weather. The Captain was a little dubious but he made a signal to the Admiral who acted on the advice, with the result that within an hour the clouds began to clear and within two hours the fleet was in fine weather. This enabled the operation to be carried out.

Then there was the sea and swell investigation. Six months before the invasion of northern France, in which weather was to play such a vital part, we set up in the Admiralty a special sub-section of our forecast section for the purpose of forecasting sea and swell. This section was manned by Naval Meteorological Officers and United States Oceanographical Officers. Using the technique developed by Instructor Commander Suthons and Professor Svedrup, the heights of waves for the landings on D-day were forecast to an accuracy of about a foot.

Finally the ice problem. Commander Burgess has said that in the Baltic the solution of the problem was not difficult, but that was certainly not so in Icelandic waters and in the Barents Sea where forecasts of ice conditions and weather generally were urgently needed in connection with the sailing of convoys to and from Russia. We were however able to give some guidance as to the position of the ice edge because it is associated with air temperature and wind direction, an unusually cold winter being accompanied by the edge extending further southward. This is in contrast to the movement of the pack ice round Iceland which is apparently independent of the severity of the winter.

I congratulate Commander Burgess on his very interesting lecture.

Professor P. A. SHEPPARD (Imperial College): I have greatly enjoyed listening to Commander Burgess's lecture in which he has shown so happily how practical problems and scientific principles are linked. I am interested in all parts of his paper, but particularly the first in which he talked about bad weather in the equatorial belt. He spoke of the region where the winds come together from north and south, forming a region of convergence and ascending air which results in heavy cloud and rain. But it was not quite clear to me what particular steps were taken by the meteorologists concerned to forecast those occasions with something like precision. It is all very well to point to an area on the chart in which there are winds converging and to say that that is a likely area for bad weather, but, as Commander Burgess himself said, the area is normally one of fine weather with occasional interruptions. It would be very useful to have some additional information on the point.

Dr. J. F. KIRKALDY (King's College, London): In the branch of the Meteorological Office which dealt with the probable effect of weather on operations, we also had many nasty questions to answer. The only ones we really liked were those in connection with swell, because we had an arrangement by which we passed them on to Commander Burgess. The paper is typical of the work which was done during the war in parts of the world about which our meteorological knowledge was often far from precise. The results are now being made available in papers like this evening's lecture and by the release of various technical memoranda from the restricted list. I think it will be found that as a result of this war-time work there will be a change of emphasis in climatology. In the past it has been very much a statistical subject. Now we are trying to explain the facts behind the statistics and to describe climate far more in terms of the influence of different air masses and the weather conditions which each one produces.

Dr. J. H. G. LEBON: After listening to this most interesting paper, I should like to make two comments. First, it occurred to me that there is a slight analogy between equatorial and British forecasting problems. Instability phenomena near the equator, for example the ill-defined rain areas, seem to resemble those associated with air streams coming directly to this country from polar regions. Thus the forecasting technique developed for the former regions may not be inapplicable to the latter.

My other point is this. Listening recently to various lectures on scientific discoveries made during the war, I have reflected on how the results could most effectively be incorporated in knowledge as a whole. It seems to me that there is perhaps an unfavourable comparison to be made here between the treatment of history and science. The history of the war is being told comprehensively in an official series of volumes written by professional historians. Does science lose because war-time researches are being disclosed in rather disconnected contributions to the proceedings of scientific societies? Could this Society use its influence to ensure that review may be made on a very broad

basis of the scientific work done within the Admiralty, the Air Ministry and other departments during the war?

Instructor Commander C. T. SUTHONS: As regards sea and swell, the major difficulty at the beginning of the war was the lack of any really reliable observations collected scientifically. Although hundreds of ships have been sailing the oceans for hundreds of years, when we came to go through such records as were available we found very few observations which were reasonably reliable. It is a difficult thing to estimate the height of sea waves from a ship, and it is only during the last few years that the scientific department of the Admiralty has managed to perfect instruments which will make the actual measurement. As a matter of interest, the biggest waves recorded during the war years—and we got observations from all parts of the world except the Southern Ocean—had a mean height of 50 to 55 feet We had that value on four separate occasions, all in the North Atlantic, and I think the Americans got similar figures from their observations. That seems to be about the limit of height of ocean waves except for an occasional freak one.

A VISITOR: I should like to ask whether or not the moon has any influence on the weather.

Instructor Commander C. T. SUTHONS: I had occasion early in the war to examine statistically the relationship between certain weather elements and the age of the moon. The resulting figures showed conclusively that there is no connection whatever between the weather elements studied and the moon.

Commander C. R. BURGESS: I think Professor Sheppard raised the question of what the forecaster looks for in the tropics. I will give two or three examples. One is the scheme of an atmospheric cross-section. If upper air reports are available—that is to say, upper air temperatures and humidities observed by aircraft or obtained by radio sonde up to a considerable height, and also observations of upper winds—these are plotted on a special type of chart for a number of stations located roughly along a straight line. That line runs usually from east to west, because weather in the equatorial regions usually moves westward, though occasionally from west to east. By means of these cross-sections one can compare the depth of the moist surface layer of air in these regions. Belts of bad weather are heralded by the approach of a very deep (15,000 feet or more) moist layer. The air in these regions during fine weather is usually moist, that is, between 60 and 95 per cent. relative humidity from the surface up to some height between 2000 and 7000 feet. Above that it is usually comparatively dry with a relative humidity which may be 50 per cent. or less. For example, in Trinidad during the latter part of the war an atmospheric cross-section was plotted from Miami in Florida to the mouth of the Amazon, roughly west-north-west to east-south-east; particularly wet weather during the rainy season could be seen approaching in the form of a deep moist layer from east-south-east.

Another method used in the Far East by the Americans and Australians again depends on the observations of upper winds; if a sufficient density of these observations is available, stream-line charts can be drawn for heights of about 3000 to 5000 feet and, with a fair amount of practice, zones of convergence and divergence can be detected. At the end of the war the Americans had many aircraft available in the western Pacific and this enabled them to obtain a good density of observations for this purpose. Yet another technique employed in the western Pacific depended upon a large number of aircraft being available. The aircraft were sent out, each with a meteorological observer, to report the weather over a large area. Meteorological officers ashore were able to plot these reports within two or three hours of the actual observations, the number of

which was sufficient to enable the forecasters to locate areas or belts of bad weather. Weather moves or develops comparatively slowly, though at times irregularly, in the tropics, and as the Americans could afford to carry out these reconnaissances two or three times a day, they were able to make short-range forecasts with a high degree of accuracy on the assumption that the existing weather and its apparent development would continue for six to twelve hours.

The CHAIRMAN: In thanking Commander Burgess for his interesting paper I should like to thank also those who have contributed to the subsequent discussion. It is very important that at these technical meetings we should have as much ventilation of opinion and ideas and as many questions asked as possible. I ask you to signify your thanks to Commander Burgess and to all the speakers.

PHILBY OF ARABIA

ARABIAN DAYS: an autobiography. By H. StJ. B. Philby. *London: Robert Hale*, 1948. $9\frac{1}{2} \times 6$ *inches;* xvi+336 *pages; illustrations.* 21*s*

'ARABIAN DAYS,' which has already gone into a second printing, will be read with appreciation by the present as well as by succeeding generations; in fact, as long as high endeavour and exploration are considered honourable among the accomplishments of mankind. Philby of Arabia gives a fair self-portrait. He does not gloss over unduly his own shortcomings which are mentioned with a touch of puckish humour. Critics will notice a tendency to weight anecdote in the author's favour, but when the last page is turned one has a complete knowledge of the man.

Names of illustrious men and women flash across the pages like meteors in an autumn sky. We are given vivid and intimate sketches of two outstanding figures in the Arab world: one is Sir Percy Cox the British Administrator, known and trusted by the Arabs under the name of "Kokus" and picturesquely described by them as the man with a thousand ears and only one tongue; director of British policy during the Mesopotamian Campaign and founder of an Arab state, modern Iraq. Few who knew Sir Percy Cox will agree with the author that "A. T. Wilson and at a later stage Gertrude Bell exercised an excessive and almost mesmeric effect on his judgment and decisions when they were physically present in his counsels." They were his staff officers as also was Philby. He would naturally ask their opinions when they had special knowledge of the problems involved and listen as he did to everyone, with attention. But any action or policy that emerged, although it may have coincided with opinion expressed, was Cox's own, unswayed by any influence.

The other portrait is of Ibn Saud the Arab statesman, whom we are able to follow from Philby's first meeting with him as Imam of the Wahabis, Ruler of Najd, until, having eliminated his rivals Ibn Rashid of Hail and King Husein of the Hijaz, he became King of Saudi Arabia.

The first part of the book deals with the author's early life, boyhood, a classical scholarship at Westminster, then Trinity College, Cambridge. His subsequent years in India followed the normal course of the Indian civil servant, and there was little to indicate the unusual career that destiny had in store for him except a knowledge of Arabic among other languages and a love of controversy for controversy's sake. Perhaps even he does not realize the extent to

which his subsequent success was due to his marriage in Murree and to the wife who was to accomplish the miracle of accompanying her nomadic husband into strange lands while at the same time giving their children the home life and upbringing that was their due, and moreover by her charm often tempering the blast that whirled round the quixotic personality of her knight who was to spend so much time in girding on his armour to tilt, when nothing better offered, at windmills.

By November 1915, war with Turkey having been joined, officers of administrative experience and linguistic capacity were sent from India to Mesopotamia to relieve Sir Percy Cox, Chief Political Officer to the Mesopotamian Expeditionary Force, of some of the routine work at headquarters in Basra, and Philby was appointed his financial assistant. Thus he began an association with that remarkable figure, who had a flair for recognizing the inherent qualities of the diverse assemblage of brilliant young men by whom he was surrounded, and for placing each in positions in which those qualities could develop.

Captain A. T. Wilson (afterwards Sir Arnold), who was Deputy Chief Political Officer, was one of these, and it was soon evident that a competitive rivalry between him and Philby had arisen. This continued, and Philby remarks with gratitude that he eventually "drove me into the desert." It is remarkable that, when the guidance and stabilizing influence of Cox was withdrawn by his transfer to other spheres, neither of the two realized their early promise of attaining high office in the service of the State.

Baghdad having been occupied Cox, leaving Wilson in charge at Basra, removed his headquarters to Baghdad, and Philby served another five months in his office. On Wilson's arrival to take over, Philby was selected by Cox to undertake an important mission to Ibn Saud and went off rejoicing into a land that was little known. On arrival at Riadth a chance of crossing Arabia by camel under Ibn Saud's protection arose. Philby, assuming Cox's consent, sent off a despatch explaining the situation to him and started for Jidda without waiting for the reply.

This as being the first of his journeys was perhaps the most momentous. He traversed hundreds of miles through central Arabia, much of which was completely unknown, and owing to careful preparation brought back material which was compiled into a map, plotted from his prismatic compass traverse with sun meridian altitudes to check latitude taken with sextant and artificial horizon, and heights from aneroid readings checked by boiling-point thermometer. The Royal Geographical Society recognized the high merit of this arduous piece of exploration by the award of the Founder's Medal. Though the main object of the journey, conference with King Husain and members of the Arab Bureau, ended abortively, Philby met in Jidda Dr. D. G. Hogarth whom he mentions in his book 'The Empty Quarter' as one of the great masters of Arabian lore. It was from Hogarth's classic 'The penetration of Arabia' that he drew his inspiration. It is sad that Hogarth could not have lived to see and appraise the fruits of that inspiration.

Philby returned to Riadth via Egpyt, Basra and Zubair and filled a long wait by a circular journey to Kharj and Aflaj and to wadi Dawasir, putting in much useful exploration. Ibn Saud's influence was not at that time fully extended in that direction and the party had a hostile reception at Dam. Philby returned to Baghdad via Kuwait and, finding Wilson in the saddle as Acting Civil Commissioner for Sir Percy Cox who was acting as British Minister in Persia, decided to ask for an accumulation of leave in England and did not return to Baghdad until 1920.

Cox, having left Persia, was in London and was returning to Baghdad as its first High Commissioner with instructions from the British Government to found the new Arab kingdom. This policy found favour in Philby's sight. As adviser to the Ministry of the Interior he was able to exercise to the full his great abilities. During the next few months he made perhaps his greatest contribution to official history by constructing under Cox's guidance the framework of the Provisional Government with Iraqi ministers and British advisory staff.

But the end came suddenly. Sir Arnold Wilson had before his departure suggested the name of Saiyid Talib, son of the Naqib of Basra, as the most likely candidate of Iraq nationality for head of the State. He certainly commanded respect but it was respect derived from fear. Tales of his swashbuckling exploits were known far beyond Basra and Baghdad and of course to Sir Percy Cox, who had early made up his mind that these were not qualities desirable in an Arab kingship which was to be rule by parliamentary and democratic government and not by the sword and pistol. However, recognizing Saiyid Talib's undoubted capabilities, he gave him the important portfolio of Minister of the Interior. When the Amir Faisal, son of King Husain of the Hijaz, was suggested as a candidate for the throne Saiyid Talib, wanting no rival, began to show signs of adopting filibustering tactics, an attitude that reached its climax at an official banquet when, after free circulation of the wine, he made a speech and issued the threat that if Faisal appeared in Iraq he would call out the tribes in his own support. To avoid bloodshed he was skilfully kidnapped and sent to Ceylon.

The names of the Amir Faisal and T. E. Lawrence, in spite of their exploits in the flank of General Allenby's Army in Palestine, were unknown or practically unknown to the inhabitants of Iraq. Sir Percy Cox was given a choice of three names as possible British advisers to accompany Faisal, of which Lawrence was one. Cox selected Colonel Kinahan Cornwallis who arrived in Basra with Faisal. Cox was determined that Faisal should come strictly on approval to be refused or accepted by the choice of the people. The result was not long in doubt; his high birth, regal bearing and presence took the townsmen, the Shia and Sunni and other factions, and also the tribal shaikhs by storm. He was accepted as King of Iraq by spontaneous acclamation before it was possible to hold an election. It was unnecessary to look further for a candidate for the vacant throne but even then Cox insisted on a plebiscite which formally elected Faisal as King.

Philby found himself too deeply committed to the Saiyid Talib candidature to fit into the regime of his rival and resigned. A short holiday in Persia followed, and then an appointment as Chief British Representative with the Amir Abdullah in Transjordan. After three years Philby resigned and left for England and also retired from Government service.

The gnawing desire to explore the Empty Quarter of Arabia was still in his mind and in 1924–25 plans for an expedition to cross it nearly materialized but fell through. During the interim Ibn Saud, unfettered by restrictive subsidies which had been allowed to lapse, had used his freedom to expel King Husain and his son Ali, first from Mecca and then from Jidda, and was now King of Saudi Arabia.

Philby became Resident Director in Arabia of a private trading company called Sharquieh Limited, with headquarters at Jidda. This coincided with an expansion of trade in Saudi Arabia and the company and its resident director prospered. It was at this time that he decided, probably owing to his great admiration for Ibn Saud, to adopt his faith and he became a Muhammadan. He explains that for the first time for many years he found himself strangely at peace with the world.

This change opened up new vistas of exploration and as a follower of the Prophet he was no longer barred from visiting Mecca. The King himself suggested a journey through the Rub al Khali on which he knew Philby had set his heart, but yet again, owing to some political event, the plan fell through. Philby mentions his disappointment at hearing the news that Bertram Thomas in 1930, by what he describes as a great feat of travel, had been the first European to cross the Empty Quarter of Arabia. Thomas had accomplished this as a Christian but in Arab clothes and with the encouragement and support of A. T. Wilson, who had joined the staff of the Anglo-Persian Oil Company, but without the knowledge or permission of King Ibn Saud whose territory he passed through for the larger part of the way. Philby hints that Ibn Saud felt a little annoyed at this and it doubtless contributed to the speeding up of arrangements for his own crossing under the auspices of the King.

At long last Philby's patient wait was rewarded, permission was given, the escort arranged and the great journey of his desire commenced at Hufhuf in 1932. He was able to obtain a last check on his chronometers at the newly installed wireless station at Hufhuf. The latitude and longitude at Hufhuf and Jabrin, the oasis 150 miles within the great south desert, had already been fixed astronomically by a previous traveller. From there on he was in unknown and uncharted country and his compass traverse, checked by astronomical observations for latitude, was therefore of great cartographical value. His course was set through the next oasis of Maqainama, a deep and isolated well which, though provisionally placed on maps by Beduin information had never been previously visited, to the fabulous Wabar where he discovered that the reported castles were in fact meteoric craters. At Shanna, having touched the route taken by Thomas at two points, he struck westwards across 400 miles of waterless desert to Sulaiyil and on to Mecca.

With the encouragement and advice of Mr. N. B. Kinnear of the Natural History Museum, Philby had in his later expeditions become a systematic collector of zoological specimens. Among his collection of birds were skins that proved to be a new species of Chikor and a woodpecker, a bird not suspected of inhabiting Arabia; this was not only a new species but a new genus. Either of these discoveries would have delighted the heart of any zoologist.

There is an interesting account of the finding of oil wells in Arabia and their development, an event of international importance and one which has gone a long way towards solving the financial problems of Saudi Arabia. It seems strange that the first concession to bore for oil within Ibn Saud's dominion, obtained by Major Frank Holmes about 1921, should have been allowed to lapse owing to lack of interest by the Anglo-Persian Oil Company or any other group. It was not until 1933 that the Standard Oil Company of California took up the discarded threads, obtained a new concession and produced one of the richest oil fields in the world.

The third major incursion into the Unknown is described by Philby as "the longest and most important of all my journeys in Arabia." It occupied nine months. The terms of reference given him by Ibn Saud were to map the newly demarcated frontier between his country and the Yemen. This, interpreted as a roving commission, included the mountain country of Asir rising to 9500 feet above the sea, the historic valley of Najran, Shabwa and a distant view of the ruined Marib dam. We look forward to "two fat volumes" of a book promised but not yet published, under the title 'Arabian highlands.'

It is hoped that the "many inscriptions of Sheba's heyday" collected on this journey will throw some light on the Ethiopian tradition connected with that Queen, and on the two Ethiopian Christian Emperors Ella Asbeha (A.D. 514)

and Gabra Maskal (A.D. 550). The former crossed the Red Sea with an army and made war on the Himyarites to avenge the massacre of the Christian martyrs of Najran; and the Viceroy of Gabra Maskal, Abreha, Governor of Yemen, built a church in Sana and even set out with thirteen elephants to destroy the Kaaba to prevent the pagan pilgrims from going to Mecca. The Koraish tribe, which even in pre-Muhammadan times was guardian of the Kaaba, fled but the Black Stone was saved by a miracle as the elephant on which Abreha rode knelt down and refused to approach it.

Readers, when they reach Chapter 9, will have gained the impression that the author is of a combative disposition, spoiling for the fight (on page 224 he relates with relish that he had a "terrible row" with the Amir Abdullah; on page 231 he says he was frequently at loggerheads with Rikabi Pasha; on page 287 he enjoyed a "battle royal" with Ibn Saud; on page 315 he describes an "unseemly quarrel" with a British Minister); and they will wonder why in 1939, when he decided to enter the British political field and contest the Hythe by-election, he did so as candidate of a group called the Peoples Party whose banner bore the strange device "Peace."

The tribunal which heard the case against Philby and released him from a term of incarceration during the Second World War provided him with one of "the most amusing experiences of my not unadventurous life."

The photographs, mostly of people, are excellent and illustrate the text; the index is ample, but a map of Arabia indicating the extent of the journeys would have been helpful.

R. E. CHEESMAN

THE SOCIAL HERITAGE OF THE WEST INDIAN NEGRO

TRINIDAD VILLAGE. MELVILLE J. and FRANCES S. HERSKOVITS. *New York: Alfred A. Knopf*, 1947. $8\frac{1}{2} \times 6$ *inches;* xii+351+xxv *pages; illustrations.* 28*s*

THE DEVELOPMENT of the science of anthropology is now showing signs of changing its direction as well as of quickening its pace. The study of the so-called "primitive" peoples has thrown a great deal of light on general problems of social organization, and has influenced not only the thinking of colonial administrators but also, in somewhat lesser degree, the theories of the sociologists investigating the social problems of Great Britain and the United States. 'Trinidad village' is typical of this new line of advance. Professor and Mrs. Herskovits have often been congratulated on their previous works, the most impressive of which have described the social organization of African peoples, and of peoples in Haiti and Dutch Guiana with close African associations. Congratulations must now be renewed, for in 'Trinidad village' they have gone a long step further.

By dissecting the culture of the Negro village of Toco, which may be said to possess many of the attributes of both African and "Western" social organization, they have demonstrated the processes whereby the one is made to blend with the other, and they have thus made an important contribution to the study of both cultures simultaneously. The culture of the West Indies is in rapid transition; its content is both African and Western, but the historical legacies of a century ago, which Professor Herskovits terms "Africanisms," are now

overlaid by a vast assemblage of culture-traits borrowed from Western sources. It is as an illustration of the process of assimilation of cultures that this study has been made. The process of borrowing "will never take place evenly over the whole range of a culture but will rather be determined by the prior concerns of a borrowing people." If there can be evolved from this an understanding of the "dynamics of culture change in general," the further step of its application as a solvent to the conflicts between majority and minority groups becomes a possibility not only in the Caribbean region or in the New World but in the world in general. The task which Professor and Mrs. Herskovits have set themselves is thus one which requires courage and ability of an unusually high order. Its importance can hardly be over-estimated.

The village which is the subject of the present study may be said, in a rough and ready sort of way, to be typical of thousands of villages throughout the West Indies. Its population drifts in and out, coming from as far afield as Barbados, St. Vincent and Tobago. Although difficult, communication is frequent with Port-of-Spain, the capital town of Trinidad. This interlocking of the social life of individual villages accounts for the remarkable similarity which may be observed between the cultural pattern of rural communities in islands which are far removed from each other in distance and between which there appears at first sight to be little possibility of contact.

To anyone with more than a superficial knowledge of the West Indies, the picture painted in 'Trinidad village' is a familiar one. The people are poor; their economic foundations are insecure; their standard of education is low; their religious life is closely bound up with African practices. They are, in general, a kindly and tolerant people among whom the burdens of existence are freely shared. If the structure of the family in Toco is much looser than the observer from Great Britain would expect to find, it is nevertheless in many respects highly organized, for family obligations are respected to a remarkable degree, those between parent and child in particular. The first impression which the book makes on the mind of the reader is the sympathy and humanity with which the authors have approached the task of understanding this rather obscure system of social relationships. They show a profound respect for the personalities of the people they study, and have aroused in response a corresponding trust and a desire to explain and to share. The people of Toco are not described as the interesting "primitives" they might appear to be to the passing tourist or the uninstructed official; they stand out of the pages as living men and women, as friends. Than this no higher praise of an anthropological text can be given.

This remarkable quality in their work is most obvious in the description of the religious "Shouting" sect, which is persecuted as immoral both in Trinidad and in the Windward Islands. That the facts do not justify the legal prohibitions which have been imposed on this sect is well established in the present study; it is made clear that its existence meets a social need which would otherwise be left unfilled in the communities concerned, and it is for this reason that the Shouters have secured the most effective championship of Professor and Mrs. Herskovits.

The thesis which the authors advance may be briefly summarized as follows. The Negro community in the New World of a hundred years ago possessed a fund of social capital derived from Africa. Much of this was destroyed by the rigours of life on the slave plantation, for these tended to strip from the Negro every part of his social heritage which conflicted with the economical operation of the estate. What was left was for the most part only the more intimate of social customs and beliefs concerning, for instance, the mysteries of birth and death. What the authors term "retentions" abound in this field. Indeed they

make an impressive point when they argue that the fabric of family life in the Toco of to-day derives its strength more from African beliefs than from any other source, for they demonstrate with great clarity the extent to which the disciplining of the young and the enforcement of family obligations derives from the compelling force of beliefs concerning the spirit world. "All this," they write, "is a part of the pattern which, with the sanctions imposed and guardianship granted by the spirits of the family dead, has given stability to family life in full African fashion, even where unions often do not endure."

In addition to the retentions which concern the more intimate human relationships, there is also a vast mass of observances, beliefs and institutions related to magic, divination and religion. It is a revealing concept, beautiful in its simplicity and in the revelation which it brings, that the hold of these practices on the West Indian peoples, and their wide geographical distribution, is due in the first place to the domination which their more impressive exponents secured over the minds of the slave owners. In a large degree it was by exploiting the superstitions of their masters that the slaves secured a measure of freedom, and this caused a variety of African religious practices to become rooted so deeply in the lives of the people that they are of paramount importance in contemporary social life. As time went on, the function of these practices gradually changed; to-day it is "in the acceptance of divination and magic as techniques for controlling the immediate problems of living that the Tocoan attains a sense of being part of a Universe that can provide him a place of dignity and security in this world as well as the next." In other words, a new social order has been built out of the material preserved from the social chaos of the slave plantation, and a new West Indian culture can be seen emerging from its African integument.

This argument is taken a step further in the chapter dealing with "the avenues of self-expression." It is pointed out that the formal political organization of Trinidad made no provision at the time the book was written for the identification of the people with the political institutions through which they were governed. Although this statement cannot be accepted without important qualifications, it is nevertheless true that from the political point of view the people of Toco are subject to "outside" control, and that this was accepted in 1939 as a regime which had always existed in the experience of the people. As a consequence, "with participation in political controls completely absent from the Toco scene, their lives regulated by power in the hands of those of different racial stock and often of foreign cultural background, frustrations arise." It may be assumed from the general drift of the book that these frustrations are only partially or inadequately dealt with by the means that lie at hand, namely through the proscribed Shouting sect, through popular institutions such as Friendly Societies, or perhaps to some extent through informal participation in the activities of such institutions as the local law courts. The general impression given by the description of life in Toco is one of a fundamentally dissatisfied society, though this is implied rather than made explicit.

To a certain extent the book appears to be dominated by a desire to demonstrate the fact of the survival of Africanisms and the processes of "retention" simply for their own sake. But the effect of contemporary social forces exerted from outside on the West Indian communities is away from retentions, and this inevitably gives rise to great internal strains. We therefore need to push ahead at least two stages beyond the point at which Professor and Mrs. Herskovits have left off. In the first place considerable further study must be devoted to the problem of frustration and the precise manner in which it is created. Dr. Dollard has, for instance, shown that the frustrated man is likely to be also an

aggressive man, and it is clear that the West Indian cannot be properly understood unless the frustrations from which he suffers are fully taken into account. It is regrettable that the authors of 'Trinidad village' did not continue their researches along the lines of investigating the extent and nature of the failure to satisfy man's social needs demonstrated by their admirable analysis of contemporary social organization.

Secondly, further examination of the problem is required to discover what are the best methods to give the people of Toco and of the West Indies in general that sense of participation in the formal institutions of political and social life, governmental, religious and economic, the absence of which is so deeply regretted in 'Trinidad village.' If this unsatisfied need lies at the root of discontent and demoralization, a constructive policy of the modern "development and welfare" type should seek to meet it. Since the collection in 1939 of the material for the book, the Governments of the West Indies have begun to make strenuous efforts in this direction. The present reviewer was associated with these efforts, and if his experience can be trusted as a guide, it will probably be found as time goes on that the discovery and application of remedial measures will prove an even more difficult task than the laying bare of the causes of the social disorganization which lies behind them. But, for all that, Professor and Mrs. Herskovits must be thanked for pointing out so plainly that the scientific study of disease must precede methods of treatment, and for making so noteworthy a contribution to this vital task. T. S. SIMEY

THE DISCOVERY OF TASMANIA AND NEW ZEALAND

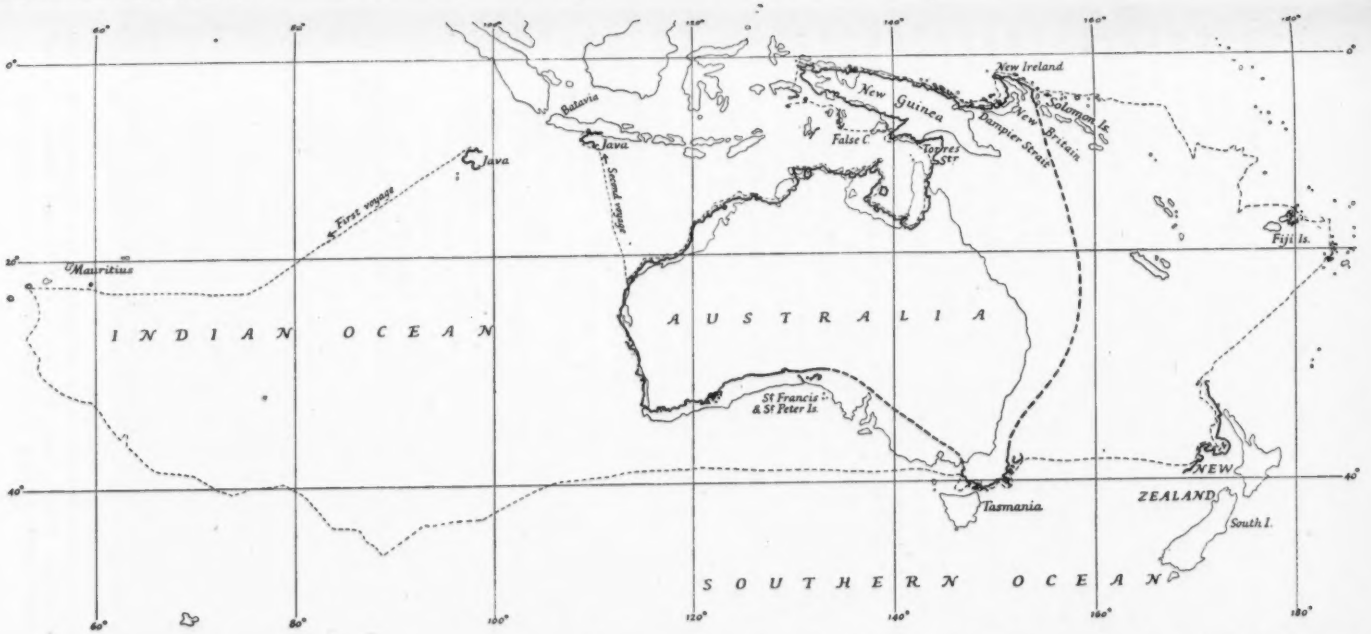
OWING TO THE circumstances of the times, the tercentenary of Tasman's discovery of Tasmania and New Zealand in November and December 1642 passed relatively unmarked in this country, where no notable work was published in connection with it. In the Netherlands Dr. F. C. Wieder published a facsimile in colour of an important map accompanied by a commentary, "Tasman's kaart van zijn Australische ontdekkingen, 1644." Before dealing in some detail with this map, it will be helpful to review briefly the circumstances of Tasman's two voyages of 1642–43 and 1644. By that time, Dutch navigators had already charted portions of the Australian coast, mainly in the west and south-west and around the Gulf of Carpentaria, and also most of the south-west coast of New Guinea. One object of the voyages was to determine the relations of these isolated portions to each other, and to ascertain whether they formed part of the great "Terra australis incognita" which figured conspicuously on many world maps of the period. But this was also combined with a strategic or political aim. The Dutch were then engaged in the long drawn out struggle with the Spanish and Portuguese. With Batavia as a centre they aimed at strengthening and enlarging their hold on the East Indies. For this purpose they sought a new route to the Southern Ocean, removed from threats by Spain, and thence to the coasts of Chile where the establishment of a base was mooted. The latter, in conjunction with the newly discovered route by Le Maire Strait and around Cape Horn, avoiding the Straits of Magellan, offered the prospect of an alternative line of communication with Europe. Though these grandiose plans never reached fruition, they formed the background to Tasman's voyages.

The instructions for the first voyage were clearly based upon a memorandum drawn up by the pilot, Franchoys Jacobsen Visscher, who took part in it and who deserves to share equally with Tasman the credit for its results. The plan was founded upon a carefully reasoned geographical basis, to take advantage of the long days of the southern summer, contemporary knowledge of the prevailing winds, and the experiences of earlier navigators. The proposed route from Batavia was south-westwards to Mauritius; thence they were to sail south-eastwards and to endeavour to reach latitude 54° S., if possible 56° S. Should no land be encountered they were then to sail in a general easterly direction to the longitude of eastern New Guinea or the Solomon Islands, and then northwards and westwards along the northern coasts of New Guinea to Batavia. As discussed later, they were allowed the alternative of sailing northwards to Nuyts Land (south-west Australia) and then following the hypothetical continental coast to New Guinea.

Tasman followed out these instructions closely, and perhaps rather unimaginatively. From Mauritius he ran as far south as 49° 4′ S. latitude, in about longitude 95° E., but was unable to continue in these latitudes owing to heavy weather and the poor condition of his vessels. He therefore continued eastwards in about 45°, and when in the longitude of the islands of St. Francis and St. Peter (in the Great Australian Bight) again took a more northerly and easterly course, which led to his sighting Tasmania on 24 November 1642. This was followed by his landfall on the South Island of New Zealand (Staten-land) on December 13. On leaving this coast he struck north-eastwards in his search for the Solomon Islands, though he had actually crossed their meridian shortly after leaving Tasmania, but this misconception led to his discovery of the Friendly and Fiji Islands groups, where he obtained much-needed supplies of fresh water. Thence on a general north-westerly course he eventually reached the northern coast of New Guinea, and continued to Batavia.

The second voyage was complementary to the first—the exploration of the south coast of New Guinea and the northern coasts of Australia. This he carried out as instructed, but failed to penetrate into Torres Strait, which would have afforded the desired short cut to the South Sea and have led ultimately to the discovery of eastern Australia. It is perhaps too easy to criticize Tasman for neglecting his opportunity; when off the eastern coast of Tasmania, for example, he does not appear to have considered proceeding to ascertain its relation to the half-revealed continent to the northwards. But it must be remembered that he set out with certain preconceptions regarding the unitary character of the "Southland," that he wished at all costs to avoid encountering a lee shore or being embayed in a great gulf from which it might be difficult or impossible to beat out, and that his vessels were not well found. He was also fairly closely tied by his instructions, among which was the obligation to consult his council of officers at critical moments. All these factors, allied to his undoubtedly cautious temperament, would account for his procedure. Actually, on his return, the Dutch authorities were inclined to be critical of his conduct.

Dutch interest in the Pacific waned after Tasman's return, and his real successors were the British navigators of the eighteenth century, especially James Cook. Between the voyages of Tasman and Cook, few outstanding additions were made to the knowledge of the Pacific, and the hypothetical southern continent continued to intrigue geographers and cartographers. In this interval English translations of summaries of Tasman's journal continued to circulate. An abridged version was published by Dirk Rembrantsz in 1674; this was translated for Robert Hooke's "Collections" in 1682, and this version was reprinted at least five times in the next sixty years. Dampier was among those who studied



Tasman's voyages and the Bonaparte chart. The heavy black outline is that of the Bonaparte chart, scaled to the coastline between New Ireland and western New Guinea, and laid down on the Mercator chart. The position of Java accepted for the first voyage, taken from an inset, is doubtful. The outlines of Northern and Western Australia, charted on the second voyage with considerable accuracy, appear to have been fitted into an earlier Dutch map, for example W. J. Blaeu's map of 1640

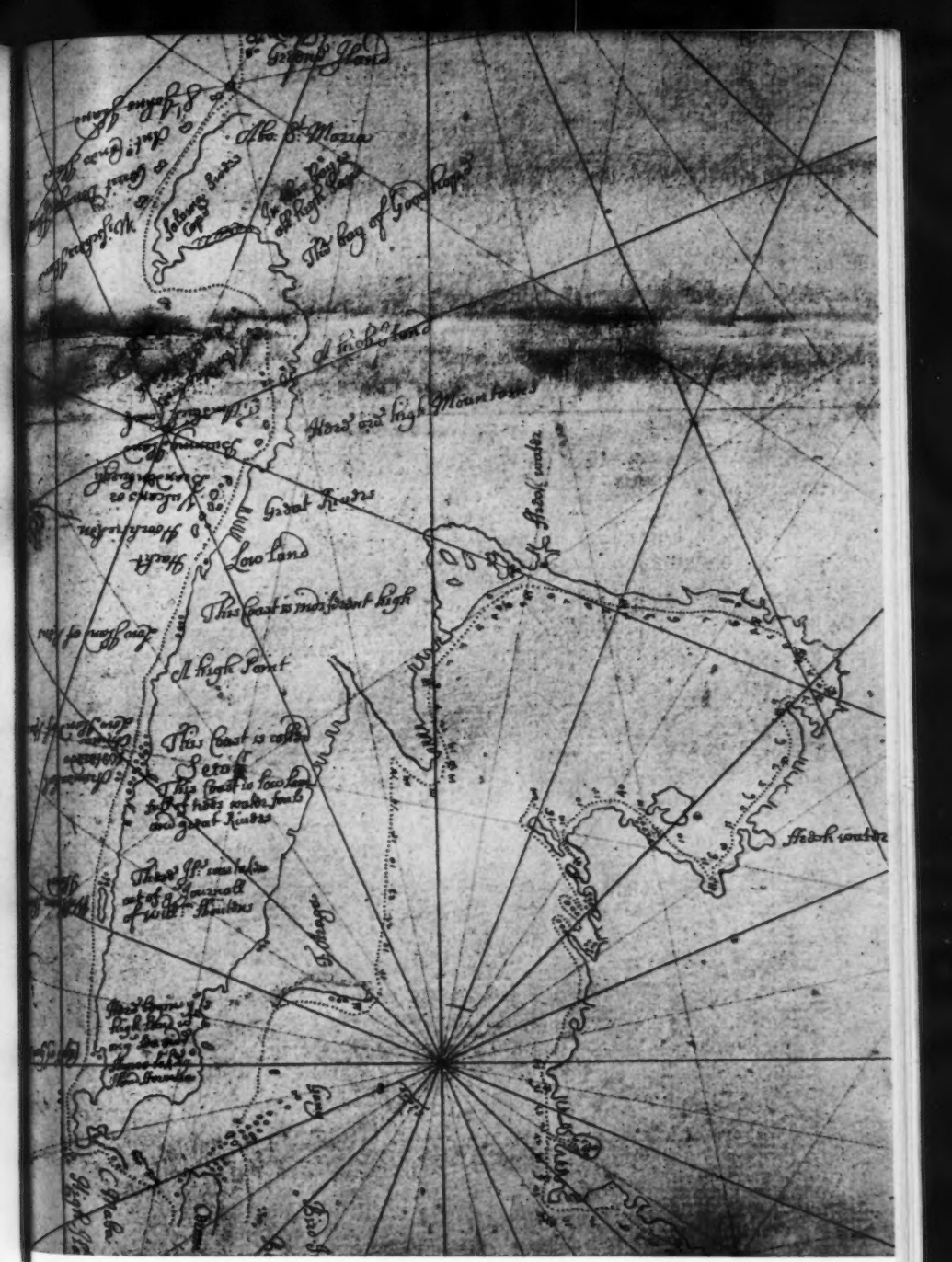
this report closely, and on his voyage of 1699 had with him a copy of Tasman's chart of the north Australian coastline. An English copy of the general chart, derived either from the Bonaparte chart or its prototype, was made about 1687 at Madras, and brought to England probably by Thomas Bowrey. (Brit. Mus., Add. MSS. 5222/12.) The connection between Dutch and English explorers is best evidenced by the consideration that Cook was virtually carrying to completion the programme of systematic exploration outlined by Visscher in 1642.

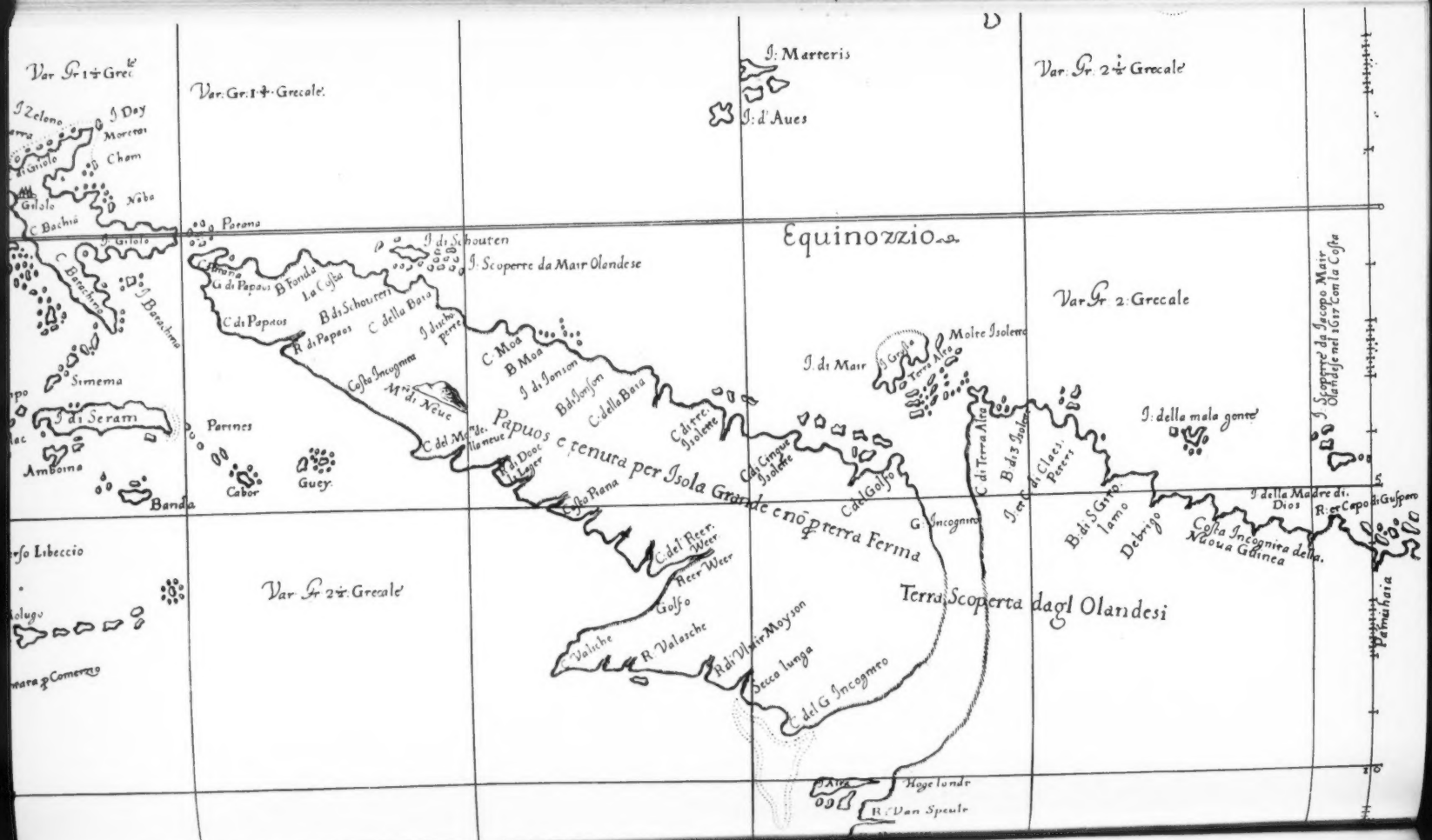
The cartography of Tasman's voyages is a somewhat obscure subject. Sectional maps accompany the various manuscript copies of his journal of the first voyage (no journal of the second voyage has survived), but the only general map which has been claimed as an original is that reproduced by Dr. Wieder, though this, as will be seen, is disputed. This is often known in cartographical literature as the "Bonaparte" map, having been for many years in the possession of Prince Roland Bonaparte. It is now in the Mitchell Library, Sydney. Previously only incomplete reproductions were available; while it was on its way to Australia Dr. Weider obtained permission to reproduce it in colour in the scale of the original. The map shows the tracks of the two voyages, for which no separate general charts have survived; it includes the north New Guinea coast charted on the first voyage, and contains details for both voyages which supplement the charts by Visscher and Gilsemans.[1] A legend on the map implies that it was drawn at the order of Anthony van Diemen, and it also bears the date 1644, but not the name of a draughtsman. Dr. Wieder however unhesitatingly attributes it to Tasman himself, who, he believes, drew it immediately on his return to Batavia.

This attribution has been challenged by several writers, for an examination of the map raises some objections not met by Dr. Wieder. The north coast of New Guinea is accurately placed in latitude, and its longitudinal extent, *e.g.* between New Ireland and western New Guinea, is also remarkably correct. On adjusting the outline of the chart to this base, it will be found that the coastline of Northern and Western Australia fits quite closely to that on a Mercator projection. It appears therefore that this portion of the chart was originally drawn on a Mercator projection, but that a plane grid (with constant latitudes) has been laid down upon it. The latitude readings therefore progressively increase towards the south. The southern and eastern portions however appear to be drawn on a plane chart, as the degrees of latitude do not increase between the parallels of New Guinea and New Zealand. The latitude scale on the chart applies to this portion, with the exception of Tasmania, for the latitudes of points on it, as read from the scale, are remarkably accurate. Tasmania seems to have been fitted in erroneously from a sectional chart. Owing to the difference of the projections, therefore, Tasmania and New Zealand, in relation to the north of Australia, fall too far north. The map is plainly a compilation from several sources without due regard to their character. M. Marcel Destombes, in his study of Dutch charts of this period,[2] points out several other considerations—faults in orthography, style of writing and general characteristics—from which he concludes that the map was drawn in Batavia about 1695. He does not consider it possible that Tasman or any of the pilots associated with him could have

[1] Dr. Wieder reproduced in his 'Monumenta cartographica,' vol. 4, a general map of Tasman's voyages ascribed to Visscher, but copied after 1666. This is superior in some respects to the Bonaparte map. I hope to examine their relationship and the whole question of the cartography in a later paper.

[2] M. Destombes, 'Cartes hollandaises; la cartographie de la Compagnie des Indes Orientales, 1593–1743,' Saigon, 1941. See also S. P. L'Honoré Naber, "Tasman's journal en Tasman's kaarten," *Tijds. K. Nederl. Aardr. Gen.* 37, ii (1920) 651.


Gorgona Island
Abo. St. Maria
The Bay of Good hope
Good high Mountains
Great Rivers
Low Land
This Coast is mayshant high
A high Point
This Coast is even
This Coast is low Land
Steep coasts
Steep coasts
Steep coasts


Var. Gr. 1 ½ Grec.
Var. Gr. 1 ½ Grecale
Var. Gr. 2 ½ Grecale
I. Marteris
I. d'Aues
I. Zelono
I. Doy
Morotai
Cham
Gilolo
Naba
C. Bachia
I. Gilolo
Porono
I. di Schouten
Equinozzio
I. Scoperte da Mair Olandese
C. Barachumo
I. Barachumo
C. di Papaos
B. Fonda
La Costa
B. di Schouters
C. della Baia
I. di Papaos
C. Moa
B. Moa
I. di Jonson
B. di Jonson
C. della Baia
Costa Incognita
M.ti di Neue
C. del M.ti di Neue
Simema
I. di Seram
Amboina
Banda
Parines
Cabor
Guey
Papuos o tenura per Isola Grande e no. p.terra Ferma
C. d'Terre Isolate
Cay Cinque Isolate
C. del Golfo
C. del Doc. Leger
Capo Piana
C. del Reer. Weer
Reer Weer
Golfo
Valsche
R. Valsche
R. di Mair Moyson
Secca lunga
C. del G. Incognito
G. Incognito
I. di Mair
B. Grasso
Terra Alta
Molre Isolette
C. di Terra Alta
B. di 3 Isole
I. di Claes Peers
I. della mala gente
I. Scoperte da Iacopo Mair Olandese nel 1617 con la Costa
B. di S. Giro lamo
Debrijo
Costa Incognita della Nuoua Guinea
I. della Madre di Dios
R. e Capo di Guspero
Hogelonde
R. Van Speult
Terra Scoperta dagl Olandesi
Var. Gr. 2 ½ Grecale
Var Gr 2 Grecale
verso Libeccio
Patmahaia

put their material together so carelessly. Without accepting unreservedly the date assigned by M. Destombes, there appears to be sufficient grounds for holding the assignation to Tasman to be "not proven." This has some bearing on points commented upon below.

In addition to the sailing tracks, the map shows by a broken line a conception of the relationship of the land masses of this quarter. New Britain, New Guinea, Australia and Tasmania are joined into a connected whole: the eastern coastline, which swells outwards at the Tropic, bears some resemblance in its southern portion to the actual outline of Eastern Australia. Dr. Wieder believes that this resemblance is due to Tasman's observations upon the direction and strength of the ocean swell, from which he concluded that he was sailing round one land mass at a distance. In the instructions for Tasman's first voyage, however, a similar configuration is suggested, though less precisely. On reaching the longitude of the islands of St. Peter and St. Francis in the Great Australian Bight, he was to consider whether he should sail northwards to these islands and "thence to follow the coast to eastward in order to ascertain how far it extends and whether this discovered southland joins New Guinea near Cape Keerweer. . . ." The instructions then continue: "but since it is most likely to be supposed that these lands join without a break, and it is uncertain whether you would be able to follow its south coast as far as Nova Guinea, owing to its north-east trend and your falling in with the eastern trade wind . . . we think the route first proposed to be the more eligible one, namely to sail to eastward as far as the longitude of Nova Guinea, or of the Solomon Islands." There is, unfortunately, no indication of the reasons for assuming this north-easterly trend of the coastline. The configuration suggested here corresponds with that of the Bonaparte chart.

Another feature of the map is the rejection of any idea of a passage between New Guinea and Australia. In the instructions for the second voyage, Tasman was bidden to examine carefully the "large bay," which was in fact the north-western entrance to Torres Strait, to ascertain whether it afforded a passage to the South Sea. In this connection, Dr. Wieder draws attention to a hitherto unnoticed inscription on Hessel Gerritz's large map of the Pacific, 1622, which some students believe was used by Tasman. The inscription gives some details of Quiros' voyage, stating that he had sailed, through many islands, shoals, and shallows, round New Guinea in 10°, and concludes that the land previously discovered from 9° to 14° [the west coast of Cape York Peninsula] must be separate from the other, *i.e.* the present New Guinea.[1] This inscription has clearly been added to the map at a later date, about 1634 in M. Destombes' opinion, and these details are therefore not incorporated in it. It has been supposed that there was no general knowledge of this voyage until the late eighteenth century. Dr. Wieder thinks that Tasman must have been aware of it, and is at pains to excuse his failure to show the strait on the grounds that he had been instructed to find a practical passage, not one full of banks and shoals, and that he had not definitely proved its existence.

None of the documents on Tasman's voyages however gives any indication that the Quiros voyage was known, except perhaps the direction to examine the "large bay" carefully. There are however references to the possibility of finding "interior" passages on the north coast of New Guinea.

On his first voyage Tasman was certainly seeking a southward passage in the south-east extremity of New Guinea. On the Bonaparte map he shows New Ireland joined to the mainland, thus producing a large gulf, to which he gives the significant name of "de bocht van goeden hoopen." In his journal there is a

[1] It was of course Torres who navigated the strait after Quiros had returned to America.

drawing of this bay with the legend "A view of the coast of New Guinea in the great bay where we hoped to find a passage through to Cape Keerweer [probably west of False Cape], but found none."

It may be noted that Tasman's search for this southern passage failed to disclose the existence of St. George's Channel or Dampier Strait. The latter, as its name commemorates, was first navigated from the south-east by Dampier in 1699. Had Tasman found it, he might have succeeded in reaching Torres Strait.

It does not appear to have been noticed previously that a contemporary map exists which shows a very similar conception. This is the second sheet of the general map of Asia in Robert Dudley's "Arcano del Mare," which has a channel extending southwards and westwards from the bay in which Tasman sought it. The "Arcano" was published in Florence in 1644, but the maps were drawn in the previous decade, before Tasman's voyages. It would seem therefore that Tasman was testing a hypothesis which had some currency at that time.[1] The question then arises: on what was this hypothesis based. First, is it merely a coincidence that at a time when the Torres statement was added to the Gerritz chart, a map was being drawn for the "Arcano" which showed a channel opening in 10° S.? It seems likely that the draughtsman, with incomplete information on the exact situation of the easterly end of the channel, attempted to fit it in with existing data. Turning to the chart of the north coast of New Guinea resulting from the voyage of Le Maire and Schouten in 1617, we find that there is a considerable gap in the coastline between the outer coast of New Ireland and the mainland coast which begins to the south-west. The compiler of the "Arcano" map, or of its source, appears to have concluded that this might be the entrance to the channel, and represented it accordingly. There is nothing however in the Le Maire and Schouten narrative to suggest that they thought that at this point they were off the entrance of a considerable passage or gulf.

As to the possible influence of Torres upon Tasman, therefore, the most that can be said is that Tasman, if he knew of the relevant inscription on the Gerritz map, or of a map similar to that in the "Arcano," was unaware of the precise location of the strait, or alternatively that, owing to his fear of finding himself on a lee shore during the south-east winds, he attempted to reach it from the north.

Dr. Wieder does not discuss this search for a passage on the north coast of New Guinea. He concludes that Tasman rather obstinately committed himself to establishing the hypothesis that there was but one southern continent and one passage to the South Sea, namely that sailed by him to the south of Australia. Dr. Wieder's book will be of much use to students of this period, and not least for the catalogue, fully annotated, of all the maps concerning Tasman's voyages, and for the map reproductions in line.

G. R. CRONE

Notes on the illustrations

Plate 1. A portion of an English copy of a Dutch manuscript chart showing Tasman's routes along the northern coasts of New Guinea (1643) and around the Gulf of Carpentaria and north-west Australia (1644). It was made at Madras *circa* 1687, perhaps by Thomas Bowrey. The outline of the coasts resembles that of the Bonaparte map, but is more crudely drawn. The names have also been transcribed or translated by someone with little knowledge of

[1] In his text, Dudley, describing the coastline east of False Cape, has a passage which may be translated "There enters a great and unknown gulf which passes, it is believed, into the South Sea towards the 'isola Hooge,' where there are other islands, near which is the 'punta della Terra Alta' discovered in 1617 by the Dutch captain Maier (Le Maire)." *Arcano*, vol. 3, p. 139.

Dutch, *e.g.* "Laeg eylandekens" is rendered "Low Iland of Kens." The position of "The bay of Good hope" corresponds with that of the "G: Incognito" of Dudley's chart. (Reproduced by permission of the Trustees of the British Museum.)

Plate 2. A portion of the "Carta secon^{a} Generale del' Asia" in Dudley's 'Arcano del Mare,' Florence, 1646. This map is based mainly on Portuguese and Spanish sources, but also incorporates contemporary Dutch work. The north coast of New Guinea is from Le Maire and Schouten; the south coast and the small portion of Cape York peninsula are from the voyage of Jan Carstensz, 1623. The northern end of the "G: Incognito" corresponds with Tasman's "Bocht van goeden hoopen"; the southern end is the entrance to Torres Strait.

THE PHYSICAL GEOGRAPHY OF FRANCE

GÉOGRAPHIE UNIVERSELLE. Tome VI, la France. 1^{e} Partie, France physique. By EMM. DE MARTONNE. *Paris: Librairie Armand Colin*, 1942. 11½×8 *inches;* 463 *pages; maps and illustrations.* 335 *fr.*

THE 'GÉOGRAPHIE UNIVERSELLE' is the outstanding geographical achievement of our generation. Conceived and initiated by Paul Vidal de la Blache before the first world war, after his death in 1918 it was carried on, or rather taken up anew, by Lucien Gallois, and the first volumes appeared in 1927. In the course of the next decade seventeen of the planned twenty-three volumes had appeared and only those covering Africa and France were still awaited. Of these, the three African volumes appeared between 1937 and 1939, but though the French volumes were practically ready in 1939 publication was prevented by the outbreak of war. Not till 1942 could the first of them be published and not till the autumn of 1946 did the second appear. The final volume is still awaited, and with its appearance this great achievement—"l'exposé de l'état complet du monde entre 1927 et 1939"—will be completed.

Originally France was to be treated in two volumes by Lucien Gallois himself, but ultimately the task was entrusted to Emmanuel de Martonne and Albert Demangeon, and it is their work which we now have before us. In both cases these volumes on France may be hailed as the *chez d'oeuvres* of their respective authors, and it is matter for great regret that M. Demangeon did not live to see his work in print. But that is not all. By their publication their two distinguished authors take rank, in some sense at least, as the representative French geographers of their time. Between them they have treated, in seven volumes of the 'Géographie universelle,' the whole geography of western and central Europe—Great Britain and Ireland, France, the Low Countries, Switzerland, Germany, Austria, Czecho-Slovakia, Hungary and Roumania. Each of these authors had in the past made purely analytical studies of penetrating character and deservedly high repute. Their achievement in the 'Géographie universelle' is to have selected and assembled from a multitude of special and analytical studies the significant geographical facts about that part of the world which, after all, has been geographically most worked over and most fully examined, though not necessarily best understood. And in turn, for the British Isles, the Low Countries and Central Europe, they have produced the most acceptable syntheses

that have yet appeared. Now, treated on a scale that is almost lavish but not disproportionate to the interest of the material, we have the first systematic synthesis of the physical and human geography of France, executed by two hands but conceived and carried out as organically related parts of a single whole. It is a triumph for the two men concerned and for the method they so ably present. Some notice has already been given in these pages of the first of M. Demangeon's two volumes (*Geogr. J.* 109 (1947) 239–40) though a full appraisal must await the appearance of the second. M. de Martonne's contribution raises questions deserving rather extended treatment and is considered here.

The Physical Geography of France: what a wealth of material those words suggest. How shall it all be contained between two covers? How shall it all be ordered, sifted and summarized and still remain readable? How shall the results of the patient researches of a multitude of workers into as many detailed problems be embodied in a single comprehensive account when, at the same time, our ignorance on many relevant topics is almost complete? The task is one that could be discharged only by a geographer whose learning and judgment are matched by his courage and clear vision, and M. de Martonne's success is an enduring tribute to his qualities. His work is essentially a pioneer effort, not merely for France but for any region of comparable complexity which has been as thoroughly investigated. It is easier, probably, to write the physical geography of a whole continent than of such regions as France, Britain or Germany. At the continental scale detailed studies of the kind that have been so abundantly made in western Europe cannot possibly receive consideration, and where almost all aspects of the physical geography are at the reconnaissance stage the limits of permissible error in attempts at synthesis are naturally large. To depict the physique of a whole continent offers to the geographic artist a wide canvas and an opportunity to apply his colours boldly with an eye to the larger relations of form and line; to deal with an area so limited and well known as France is rather to piece together a mosaic from fragments shaped, for the most part, by other hands and largely for other purposes.

A numerical comparison is worth making here. In Baulig's 'Amérique septentrionale,' the physical section bulks larger than in any other volume of the series. That section deals with the characters of some 7 million square miles of territory in about 120 pages, a ratio of nearly 60,000 square miles to a page. The corresponding figure for M. de Martonne's work is remarkably low—only 400 square miles to a page. Or we may make comparison of the purely morphological section of M. de Martonne's volume with an outstanding work in the same field, Fenneman's 'Physiography of the eastern and western United States.' The latter, despite its two well-packed volumes, covers the terrain at the rate of some 2500 square miles to a page; M. de Martonne's at only 750.

'France physique' opens with a brief but masterly essay on the familiar theme of the relations of France to Europe as a whole. The temptation to quote from it is not to be resisted. In one place he says: "A frame corresponding to the roughly pentagonal outline of France may be moved about the map of Europe: in some positions it will embrace a larger proportion, be it of plains as beside the Danube, of Hercynian uplands as beside the Elbe, or of high mountains as in the region of the sources of the Rhine, Rhône and the Adige: but one will search in vain for another position in which the three elements are as well represented as on the territory of France." And in another: "France owes a great part of the originality of her geographic physiognomy to the conflict which may be discerned in the climate and vegetation between Atlantic, Mediterranean and continental influences, a conflict which is conceivable only in the context of an isthmian situation at the confines of western and central Europe."

Nearly two-thirds of the volume (274 pages out of 442) are devoted to morphology and designated Part I. About half of Part II deals with climate and the remainder is shared between hydrology on the one hand and vegetation and soils on the other. This emphasis on morphology M. de Martonne justifies by likening it to the draughtsmanship and anatomical studies that underlie a painting by one of the classic masters. "Aucune peine ne doit être épargnée pour cette préparation d'ou dépend toute la fidélité du tableau."

Morphological description involves both scientific discipline and literary judgment and M. de Martonne certainly displays both. He begins with the problem posed by the map of France in a good school atlas—the relation of mountains, lowlands and "massifs moyens" to the major structural units. But a brief examination reveals that "on ne saurait entrer dans les details d'une description plus précise sans on voir surgir d'autres à chaque pas." He therefore turns back to examine the growth of morphological ideas in France, the better to appreciate present problems. In France, as in Britain, one of the prime morphological generalizations to emerge concerned the dependence of form on rock substance and structure, and M. de Martonne hails the year 1888, which saw the publication of 'Les formes du terrain' by La Noë and de Margerie, as the most important date in the history of French morphology. This account was based essentially on the work of such French pioneers as Elie de Beaumont, Surrell and Dausse, but it also reflected the views that were then developing so rapidly as the results of the labours of such geologists as Heim, Richthofen, Powell or Dutton elsewhere. Upon the body of ideas which it summarized came the impact of the brilliant tectonic synthesis of Suess which became "le bréviaire non seulement des géologues, mais de bien des géographes français," followed by the very different impulse provided by the ideas of W. M. Davis which have borne fruit in many local studies revealing the complexities of both process and denudation chronology. To these influences must be added the shock of the revelation of the nature of alpine structure, and the conviction reached by many French workers of the validity of the notion of eustatism. It is against this background of ideas that M. de Martonne re-examines the problem of describing the relief of France and concludes that the basis must be regional and structural.

Tectonic dislocations, diversity of rocks, and epeirogenic movements are the three factors which together give individuality to the major morphological regions, while to the sculpturing work of successive cycles of erosion are to be attributed the more local details of form. Description is therefore affected under some eight headings: the Paris Basin; the northern hercynian massifs (Armorica, Ardennes, Vosges); the central plateau; the Alps; the Jura and Saône basin; the Mediterranean façade with the Rhône corridor and Corsica; the Pyrenees, and the Basin of Aquitaine. There is an additional chapter on coastal forms. Of all this the descriptions of the Alps, the Paris Basin, and the *Massif Central* far outweigh the rest in volume and interest and are the core of the book.

Naturally the description of the Paris Basin has greatest interest for English readers and offers many points of comparison with southern England. The account begins with a very thorough discussion of the relation of the newer rocks of the basin to the palaeozoic basement revealed at its margins, and passes on to consider the pre-Tertiary, palaeogene and neogene growth stages and the topographic expression of contrasts in structure and lithology, particularly between east and west, and north and south. A second chapter then discusses the origins of the drainage system and some specific drainage problems, describes the principal erosion surfaces that bevel the uplands, and touches briefly on the phases of valley incision, terrace development and solifluction phenomena, before concluding with a series of brief regional characterizations. The reviewer

could not fail to note—with great interest and pleasure—how closely parallel is this presentation in both order and content to that adopted by Wooldridge and Linton in their discussion of the morphology of south-east England. The parallelism extends even to the illustrations; the sections that demonstrate the relations of cover rocks to basement, the contoured maps illustrating the Tertiary deformation of the palaeogene (=pre-Eocene) surface, the maps showing the distribution of the remains of the principal erosion surfaces, of the "formations continentales charactéristiques de l'histoire morphologique," and of the consequent and subsequent elements in the drainage system, and the local maps showing the "morphologie structurale" of selected regions—all these have their place in both accounts. In no small part this reflects the influence of M. de Martonne's methods of description and illustration, as exemplified in his earlier works, on younger workers elsewhere, and the reviewer is happy to be able here to pay respectful and grateful tribute to that influence.

There are some interesting developments in the Paris Basin however that are without parallels in the English record. The early Tertiary Paris Basin, like the smaller basin of Hampshire, was open to the sea in the English Channel region, but towards the end of Oligocene times the connection was broken and the *Calcaire de Beauce* (Oligo-Miocene in age) was accumulated in a fresh-water lake. To-day this limestone, which was of course originally level, dips southward from heights of 500–600 feet just south of Paris and passes below the well-known Sologne sands. These are nothing but the debris laid down in vast fans by the rivers of the central plateau between its northern margin and the slowly rising, deformed limestone surface farther north. For a time aggradation kept pace with elevation and a proto-Loire flowed northwards somewhat east of Orleans and Chartres to leave granitic sands at high levels in the country of the lower Eure and the lower Seine (*Sables de Lozère*). Ultimately this stream was defeated by the continued warping of the basin floor and turned westward into the depression then occupied by an arm of the sea (*Mer des Faluns*), but after the retreat of the latter followed the present Loire below Blois. M. de Martonne is probably right in attributing this interesting event to renewed movement of the well-known axis of uplift of the Bocage and Haute-Perche. He does not however mention another point of kindred character. Between the drainage of the Seine with its right-hand tributaries, and the Somme and other streams draining directly to the Channel, a watershed may be traced from Le Hâvre directly eastward for fully 150 miles and forming throughout a broad swell in the surface of the chalk plateau. A little farther east this line is crossed by the Oise, but if M. de Martonne's map of drainage origins is right in implying a former connection between the upper Oise and the Somme this line would continue eastwards as a watershed almost to the valley of the Meuse. It seems likely that this striking line of water-parting is a broad structural swell, and it is tempting to associate its initiation, and by inference that of the streams that flowed from it, with the closing of the lake which saw the accumulation of the fresh-water *Calcaire de Beauce*.

Mention was made earlier of the inevitable difficulties that attend any attempt to give a detailed explanatory account of the landforms of such a region as France. The reader must therefore not be surprised if some of M. de Martonne's statements are less precise or less informative than he had hoped. The map that accompanies the account of drainage evolution contains many suggestive or obscure points to which no reference is made in the text, and no attempt is made to correlate drainage evolution with the stages of denudation chronology. More serious, that chronology is itself hardly even sketched, and the map of erosion surfaces distinguishes them in some areas by age (Palaeogene and

Neogene) but in others adopts a different criterion, namely situation (Beauce and Brie).

Nor are such difficulties felt only with regard to the Paris Basin. While tribute is paid to Baulig's monograph on the morphology of the *Massif Central*, no mention is made in the account of that region of his views of its post-Pliocene development nor of the platforms recognized there which he would attribute to eustatic changes of sea-level. Nor does the account of the Armorican Massif mention his tentative identification of the lower of these same surfaces in that area or of the significance which may attach to the discovery by Y. Millon that certain of the sandy plateau deposits of the Breton uplands (termed "Dépôts continentaux" in Fig. 31) contain grains of glauconite, a mineral of marine genesis. Even the paragraph on eustatism in the chapter on Mediterranean France is concerned almost solely with attacking the theoretical concept of eustatism and says virtually nothing concerning the extent and attitudes of the late-Tertiary platforms which, whether they be related to eustatic changes of sea-level or not, are significant geographical features of the region. It is noteworthy too that though M. de Martonne is insistent on the demonstrable post-Pliocene warping on the borders of the Alps he makes no mention of the possibility that such uplift may represent isostatic response to the work of denudation. He recognizes that "the work of erosion is the measure of that of the orogenic forces," but the point made familiar to readers of this *Journal* by Wager's account of the transection of the Himalayas by the Arun gorge, and put forward theoretically by Jeffries as long ago as 1927, is not considered.

Of the two chapters on the Alps, one is general and the other regional. The first essays the immense task of reducing all that is known or not known about Alpine morphology—the relations of form to the complexities of structure, the origin of the drainage, the recognition of the old high-level forms and their rejuvenated successors, and the evaluation of the part played by glacial erosion—to a single perspective view, and on the whole succeeds. A feeling for the large issues involved and a sense of proportion is well conveyed. But some points of detail are less satisfying. A single paragraph on cirques is far from adequate and says nothing of the variations in mountain form and plan that result from the varied severity of glacial attack in different parts of the region, though an interesting correlation is made with lithology. Even more obvious an omission is that of any quantitative data on glaciated valley forms, and in the absence of scale sections it is unfortunate that the only diagram showing a glaciated long profile is a modified version of a singularly obscure and debatable illustration borrowed from the 'Traité de géographie physique.'

Space does not permit the further discussion of the morphological chapters of this work, but mention must be made of the admirable illustrations. The photographic illustration is lavish (some 127 views) and most of it from M. de Martonne's own negatives. The diagrams and maps, as always in this series, are models of clarity, but it is to M. de Martonne that we owe their ingenuity and perpetual relevance, and above all the sixteen block-diagrams that enliven the regional descriptions. Most ambitious of all is the morphological map of all France at a scale of 1/2,500,000, which is placed at the end of Part I and so folded that it can be consulted with any page of the morphological text. This map, based on four plates of the Atlas of France, will be a revelation to many for it shows virtually every morphological feature of any size in France, using four hypsometric tints and overprints in six colours for the conventions representing landforms. Despite its ingenuity and elaboration, however, there may be others who share the reviewer's opinion that something simpler might have told a more limited story more effectively.

Part II deals with climate, rivers and vegetation. The first of the two chapters on climate treats the systematic aspects—distribution of temperature, precipitation, rainfall regimes, wind and weather—with admirable clarity, and has some interesting material on local winds and associated isobaric situations, but is a little out of touch with latter-day meteorological literature and makes no use of the concept of air masses. The succeeding chapter on regional types of climate however is climatological writing of a high order, such as we have learned to associate with the author of the chapter on mountain climates in the 'Traité.' These seventeen pages might well serve as a model to British climatologists (and even geographers) of a kind of descriptive writing that is practically unknown in their literature.

The two chapters that follow are entitled "Hydrography," but their contents cover only a limited portion of the field suggested by this rather comprehensive term. Apart from the exclusion of marine waters which is hardly compensated by a brief mention in the coastal chapter, there is no consideration of the lakes of France, though such might have been expected and hoped for by those who remember M. de Martonne's treatment of limnology in the 'Traité.' British geographers, who would naturally look here for some treatment of ground water problems, will be disappointed. Such topics as the distribution of permeable and impermeable strata, the location of springs and the volume of spring supplies, artesian water and the location in depth of the principal aquifers find no mention here. If there are bourne flows in the dry valleys of the French chalk the fact goes unrecorded. With the single exception of the question of flood warning and protection, no consideration is given to what may be termed the applied aspects of hydrology—the supply of drinking water to the great cities, of industrial water in the north, of irrigation water in the south, or the solution of the problems of volume and head in connection with France's three million kilowatts of installed hydro-electric capacity. Only one problem is in fact taken up, the problem of seasonal flow in rivers and particularly in the four great rivers of France.

Within these self-imposed limits a brilliant success has been achieved. The earlier chapter comprises an admirable and detailed characterization of the four hydrographic provinces of France, the later of the characters of her major rivers. The province of the Atlantic plains covers more than half France and is characterized by its low discharge ratios (D/P rarely >30 per cent.), large and uniform evaporation deficit (P–D about 500 mm.), feeble specific flow (10–12 litres per sq. km.), and a purely *pluvial* regime dominated by the evaporation losses of summer and ameliorated by the returned ground-water from springs. The upland (*montagnarde*) province, embracing another quarter of the country, has discharge ratios double those of the plains province and regimes which, according to the extent to which they are effected by winter snow-retention and spring return of thaw water, are termed *pluvio-nival* or *nivo-pluvial*. In the small alpine province discharge ratios are commonly at least 70 per cent. and may be 80 or 95 per cent. and the regimes are frankly *nival* and *glacial*, while in the equally limited Mediterranean province the excessive evaporation deficit (at least 600 mm.) dominates and discharge ratios are the smallest in France.

It is in the light of these considerations that the complexities of the major river problems are unravelled, and it is shown how it comes about that the trunk rivers "are generally out of accord with the local conditions of the regions they traverse." Vivid descriptions are well supported by numerical data to provide another piece of masterly geographic writing that has no British analogue. M. de Martonne complains that geographers have not given to the data of flood records and river engineering the attention they deserve, but had he been writing on this side of the channel he would have had more than lack of geographical

interest to regret. French river studies have, from the time of Belgrand's classic monograph on the Seine in 1872, been conspicuously thorough and illuminating and their like has yet to appear in Britain.

Vegetation is treated in a shorter chapter on systematic relationships and a longer one on regional aspects. In the latter, as in other regional chapters, M. de Martonne excels, but the former is the weakest in the volume. The question is asked at the outset whether a geographical discussion of the vegetation of a country so long settled as France is possible, and although answered in the affirmative it is never made logically clear just what vegetation is being discussed. Sections follow on soils, on the floristic repopulation of France after the climatic crises of the Quaternary period, on the main types of vegetation formations, and on the action of man. The evolution of the flora makes an attractive story, but the vegetation formations are not defined in terms that would be helpful or satisfactory to an ecologist and the treatment of soils seems hardly better than useless. A simplified map after Agafanoff recognizes three zonal groups, Atlantic, Eastern and Mediterranean, with alluvial, limon, limestone and crystalline areas distinguished within each, together with marsh, dune and mountain soils, and is accompanied by barely a page and a half of text. This does justice neither to modern soil research with the obvious relevance of its emphasis on the importance of vegetation as a factor in pedogenesis, nor to the traditional findings of geologists and agronomists on soil texture and acidity. Neither the validity of broad zonal correlations nor the strength and importance of local contrasts is brought out, and the relevance of the section to the rest of the discussion is not established.

At the close of this monumental survey M. de Martonne puts his countrymen and his fellow geographers still further in his debt, by providing in a short final chapter his own review of the ground he has traversed. And of this it need only be said—whatever else you omit, read this. DAVID L. LINTON

REVIEWS

EUROPE

RURAL LIFE IN NORTHERN IRELAND. By JOHN M. MOGEY. (Five Regional Studies made for the Northern Ireland Council of Social Service.) *London: Geoffrey Cumberlege, Oxford University Press*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xvi+240 *pages; sketch-maps, diagrams, and illustrations.* 15*s*

The aim of this book is "to describe the way of life of the country people of Northern Ireland," and its appearance is the first fruit of the work done by the Northern Ireland Council of Social Service which was formed in 1938 to "re-establish a sound rural economy." So far this body, of which Mr. Mogey has been the Rural Survey Officer since 1941, has been a fact-finding commission, enquiring into the drift from the countryside, its causes and effects, together with the influence of education, farm mechanization and the modern motor-bus service upon rural communities. Five sample areas were chosen for enquiry, each of them different yet not untypical of other parts of Northern Ireland. The areas are, first, a lowland of clay soils in Co. Fermanagh; second, a hillfoot on the west of the Mourne mountains; third, the skilfully farmed Braid Valley in Co. Antrim; fourth, a district near to Belfast with milk and vegetable production, and fifth, a mixed farming country in the north of Antrim. The field-work involved a long stay in each of these areas, during which every household was visited except those of professional people and a series of enquiries made and recorded on forms. Almost a thousand families have been analyzed by their composition, religion, spare-time interests, house, farm, income and expenditure, and population movements of the husband's and wife's families as well as those of the existing family. So thorough a method of research compels respect: its justification lies in Mr. Mogey's own saying, "The voices of the people are rarely heard when rural life is discussed; both because of their numbers and the commonsense of their outlook, they deserve to be heard."

The farmers are, as Mr. Mogey justly says, the highest social group in the countryside (apart from the professional classes); below them come the small shopkeepers and the farmers of dwarf holdings who supplement their income by intermittent labouring, and the comparatively few full-time farm labourers; also represented is the "pensioners and retired" class of the community. It is clear that the estimation of income among these classes is easier than among the farmers, as rates of pensions and agricultural wages are fixed. To Mr. Mogey and his colleagues, working on the Beveridge subsistence scale, it appeared that "the presence of two children to a single wage-earner is sufficient to cause the family to fall below the standard" of minimum subsistence. When these calculations were made, the wages paid were around 50*s*., whereas they are now 66*s*. to 73*s*. The fact remains that labourers were underpaid and underhoused, especially in Co. Fermanagh where no new cottage was built with any form of government assistance between 1922 and 1945 and "there are more houses inhabited which are classified as unfit for human life than there are satisfactory dwellings" (p. 207).

Material is present in this book in abundance, but an effort to synthesize it is less successful than it might have been. There are numerous tables with supplementary comment, for statistics alone are not enough: for example, in one village (pp. 146–7), a "worker's settlement," there is an average of 4·5 rooms per house divided into 1·7 living-rooms, 2·3 bedrooms and 0·5 pantry, and we

are told that there are old houses "in long rows or closes," new houses "well designed but badly sited," and over fifty others, mainly in a row built by a speculator. Beyond the information that many are two-storied and some one-storied, and some data on fuel supplies and sanitation, it is hard to gain a clear impression of any house in the village; and there is no plan of the village itself though an elaborate analysis of the occupations of the people is given. Would not an assessment of the quality and suitability of each house and an arrangement into types have been more illuminating? Of much greater value, in the estimation of the reviewer, is the observation that most people wish to live in isolation from their neighbours so that their cottage will not be "overlooked," though if this is partly an expression of over-abundant antagonisms it is difficult to envisage the emergence of a community spirit. One longs for more evidence of such statements as "Faction fights between townlands were common until recently and occur in a modified form even yet" (p. 16). Religious differences, political cleavages, social stratification, all tend to make divisions among people who should be united.

There are a number of attractive photographs, some excellent maps and diagrams (though in some the sources might well have been indicated), but too many farm plans showing nothing but the layout of the fields, some of them not described in the text. There is also an interesting glossary of local terms, such as to "set" land (to let it). On the other hand, students may regret that there is only a general bibliography, for the work has been "largely unburdened of specific references to books consulted in its preparation," though it is promised that "individual regional studies will receive full scientific publication later, and a complete list of sources will accompany these articles." T. W. F.

PLAN YOUR OWN INDUSTRIES: a study of local and regional development organizations. By M. P. FOGARTY. *Oxford: Basil Blackwell*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* viii+320 *pages.* 25*s*

Many readers of the *Journal* will have noted the evidence of interest in the economic problems of the country developing amongst geographers at about the time of the formation of the Royal Commission subsequently responsible for what is commonly known as the Barlow Report. Long before this, many of the development organizations forming the basic subject matter of Mr. Fogarty's analysis had been brought into existence and had undertaken a variety of activities, all primarily directed towards alleviating the economic and social distress most apparent in the then Special Areas. Their work, in which a very few geographers shared, has been closely examined by Mr. Fogarty. He sets out the facts of their organization, their objectives, their problems and the extent to which they achieved success. He demonstrates the varied character of voluntary organizations, some being regional, others having a more restricted field of operations.

Whilst there was some indifference towards development organizations on the part of the Departments centred in Whitehall, there were exceptions and in any case much that was achieved made it imperative that there should be recognition and consultation. These organizations were important influences on location-of-industry policy; but after 1943 new legislation and the creation of regional offices and research sections of Government Departments suggested to some that the existence of the voluntary organizations was no longer necessary. It is a reasonable conjecture that this attitude would not have been adopted if officials of the Ministry of Labour who had worked with the Commissioner for the Special Areas had been more closely associated with those now given new powers in economic and physical planning. The development organizations however were

convinced that they had a part to play and refused to die. They took up their reins and adjusted their course to the new conditions, and have found, as Mr. Fogarty says, some symptoms of appreciation on the part of Government Departments of the value of their advice and cooperation. The self-sufficiency of Government Departments in matters of regional development cannot be maintained, and provided the voluntary organization has the necessary resources and qualities it can help in numerous ways. There remains however much ignorance of the work of such bodies. Mr. Fogarty's first-class analysis removes any excuse for it. Those geographers who now find themselves undertaking research for Government Departments and those in university departments who display a tendency to work in the field of applied geography should especially note the facts and the conclusions. A larger number of geographers might well gain valuable experience through contributing to the research work of the voluntary organizations. G. H. J. D.

ASIA

KINGDOM OF ADVENTURE: EVEREST. By JAMES RAMSAY ULLMAN. *New York: William Sloane Associates*, 1947. $8\frac{1}{2} \times 6$ *inches;* 411 *pages; maps and illustrations.* $4.75

We have it on the authority of his publisher that Mr. Ullman is an experienced mountaineer and there can be no doubt that he has a passion for mountains. He is also a competent and practised writer. These qualifications however are not in themselves sufficient for handling the story of Mount Everest. Mountaineers and travellers have reacted variously to the Himalaya but they are unanimous in one thing—that the Alps of Europe, America or New Zealand give little foretaste of the effect that the great Himalayan peaks have on those who attempt to climb them. In writing without first-hand experience therefore, Mr. Ullman lacks the most important qualification for preparing a chronicle of Everest expeditions. He has wisely not attempted to tell much of the narrative in his own words, and the book consists mainly of excerpts from the writings of Everest climbers linked together by his explanatory comment. Many of the extracts have been well chosen, but Ullman's feeling for drama and heroism is so strong that the anthology gives a most unbalanced view of the attitudes and motives of those who have taken part in Everest expeditions. Had he included remarks such as Shipton's to the Society after the 1938 expedition, that "bedsores, both physical and mental, are a greater hardship than altitude," his readers would have come nearer to meeting the climbers as their friends know them. But to Ullman the story of Everest is a Homeric epic. Mallory naturally is his hero, but the story is spoilt by extravagant writing which is all the more noticeable by contrast with the quotations from Mallory and his companions.

If the book had succeeded in giving a faithful impression of Himalayan climbing, minor errors could have been ignored. As it is they increase the reader's irritation. Serious omissions make one wonder how carefully the author has studied his subject. In the introductory history of Himalayan climbing there is no mention of Dr. Longstaff climbing Trisul, an outstanding event in early Himalayan adventure. Dr. Raymond Greene is divided into two distinct individuals separately indexed. These examples are drawn from many. Other features of the book are repellant. Must Everest climbers be "Everesters" and the author a "vicarious Everester"? And is the layout necessary? Each quotation is headed by the name of its author and, since James Ramsay Ullman has contributed considerably more passages than any of those from whose books he has borrowed, his name (in the same type as George Leigh Mallory or Frank S. Smythe) strikes the eye with monotonous regularity. R. S. R.

AFRICA

CARTE GÉOLOGIQUE INTERNATIONALE DE L'AFRIQUE. Feuille 3. *Paris: Bureau d'études géologiques international*, 1939. 24×23 *inches*

This map forms part of a series of eight geological sheets at a scale of 1: 5,000,000, planned in 1922 at the Brussels International Geological Congress, to cover Africa including the Levant, Syria, Iraq and Arabia. Sheet 1, covering North-west Africa west of the Greenwich meridian, was published in 1936. Sheet 3, the subject of this notice, covers Arabia, Palestine, Transjordania, Syria, Iraq and a small part of the African continent west of the Red Sea. The inclusion of Arabia and adjacent countries in a map of Africa may seem anomalous to a geographer, but it is of course an accepted geological fact that Arabia belongs to Africa geologically, being only separated from it by the rift faulting responsible for the Red Sea.

The compilation of small-scale geological maps is an unenviable task, because it entails generalizations in the realms of stratigraphy and lithology often very difficult to make; such generalizations are best made by those who know the rocks in the field. The number and reputation of the collaborators for this new map, both institutional and individual, are sufficient guarantee of its worth; only for Oman does first-hand knowledge seem to be lacking.

The usual international colour scheme is used, with additional letters and symbols. The legend is packed with information which requires careful reading before the map is studied in detail. Thus the Nubian Sandstone has been coloured as undifferentiated continental Jurassic and Cretaceous, and letters and symbols have been used to indicate where it includes sandstones of Triassic or Palaeozoic age. Readers who miss the boldly coloured zone of Trias and Palaeozoic Nubian Sandstone on the north of the main Arabian crystalline mass, shown in earlier small-scale maps (Wissmann 1932; Lamare 1936), will find consolation in the legend.

A minor criticism can be made of the somewhat uneven portrayal of tectonic detail. Thus Palestine, Syria, Yemen, and the coast between Makalla and Aden have been liberally marked with normal faults but none are shown elsewhere. It is also a little inconsistent to show the metamorphic Nappe Zone of north-east Iraq by special hachuring, and to make no attempt to bring out the metamorphosed and thrust nature of the Hatat Phyllites and Hawasina series in Oman, where these rocks are coloured as undifferentiated marine Jurassic and Cretaceous. The age of the Hatat Phyllites is given by Lees as pre-Permian.

It would have been advantageous, in the reviewer's opinion, if a salt-plug symbol had been used for the islands in the south part of the Persian Gulf instead of colouring them as Cambrian without comment. This Cambrian has of course punctured its way through many thousands of feet of overlying sedimentary rock to reach the surface. To omit this fact gives the impression (to the uninitiated) that the south end of the Gulf is a foundered continuation of the Oman massif. The salt outcrops on the Assir coast, in the Farsan Islands, at Surnha and at Jebel Usdam (south-west corner of the Dead Sea) are also worthy of note.

There are a few small errors of colouring in the Oman region, and the Kuria Muria Islands are curiously only shown by name.

It is hoped that the next edition of this sheet will be allowed to incorporate the many interesting findings of the Oil Companies working in Arabia. The Companies, in common with all geologists interested in the area, are certainly indebted to the International Geological Congress for the preparation of this most useful compilation. N. L. F.

GEOGRAPHY OF NIGERIA. By C. T. QUINN-YOUNG and T. HERDMAN. *London: Longmans, Green*, 1946. 7×5 *inches;* viii+219 *pages; maps, diagrams, and illustrations.* 5*s*

The preface says "the book is mainly intended for the higher classes of Primary Schools and for Secondary Schools. It is hoped also that teachers will profit by it, and that the general public in Nigeria as well as all who are interested in the British Commonwealth of Nations will find it useful." It seems obvious that no text can meet all these needs, and it is hoped that the present book will at least soon be followed by a simple one suitable for primary schools.

The first six chapters are concerned with general world geography and the remaining thirteen with the more detailed geography of Nigeria. The Nigerian chapters contain much interesting material—interesting to geography teachers in this country as well as to teachers and pupils in Nigeria—but its presentation might have been more effective if regional methods had been followed, especially for school purposes. The book represents another praiseworthy attempt to provide Colonial schools with specially written geographies of their own country, and as such is warmly welcomed. L. B.

NORTH AMERICA

GRASSLAND OF NORTH AMERICA: prolegomena to its history. By JAMES C. MALIN. *Lawrence, Kansas: J. C. Malin*, 1947. 8½×5½ *inches;* viii+398 *pages.* $3.00

In an earlier publication the author reviewed aspects of general historiography and of methodology ('Essays on historiography,' privately printed, Lawrence, Kansas, 1946). The technique of historical and geographical study, to which the rather unattractive name of "historiography" is apparently intended to refer, is now applied to that region of grassland in the North American continent designated in this work the Trans-Mississippi West. This region, which presented to the Anglo-American pioneer forest man the special problems of living in a grassland, is that frequently and rather loosely described in agricultural literature as the Great Plains, but which is here defined as having its eastern extremity in a triangular prairie peninsula between the Great Lakes and the Ohio River, and extending westward from this eastern forest boundary through passes in the Rocky Mountains across the continental divide to the south-western deserts and farther north to the Palouse Prairie.

The present work takes the form of a review of the literature of a number of special sciences in so far as they concern this grassland environment, and is written from the point of view of the historical geographer concerned with the period since the region was found in its natural state by the European at the beginning of the sixteenth century. One thus finds reviewed the literature on the ecology of plants, animals, insects and the biome as a whole, on climatology, geology, geography, soils and on the regional grass formations and types. After reviewing the work of the ecologists who have specialized in this part of North America (Clements, Weaver, Marbut, Shreve, Dice, Shantz and many others), Professor Malin puts forward the historian's proposal to map the grass associations on an east–west basis to recognize water relations and altitude, and on a north–south basis to recognize the latitudinal differences in light and temperature to which physiologists such as Olmsted have been drawing attention. It is also suggested that, in mapping these vegetation areas, it would clarify matters to introduce the concept of nuclear and mixed associations, the former term to apply only to those areas where the ecological factors combine to

provide approximately optimal conditions for the dominant plants, and to a lesser degree animal species.

Although the greater part of this book is primarily of American or even more local interest, the whole approach to the problem by a historical geographer will be of great interest to the workers and writers in other fields whose work has here been brought under review. "These chapters are probably not what scientists in each of the respective fields would write, and what the scientists would write might not be of the most direct value to the historian."

Probably the chapter which would provoke most discussion is that on the grassland equilibrium, in which Professor Malin attacks the great mass of literature on soil erosion and conservation in the Great Plains produced by Government agencies and private bodies, all devoted to building up a "legend . . . that the western country was becoming a desert." The documentary film 'The plow that broke the Plains,' and Steinbeck's book and film 'The grapes of wrath,' both come in for drastic criticism. Having himself read and seen much of this conservation "propaganda," and having also seen the ruin of land and human degradation in the Dust Bowl of the Great Plains, the reviewer can only hope that this defence of land-use practices in the grasslands is well-founded. The damage caused by erosion throughout the world is so great that none would surely attack a conservation policy without very good reason. R. O. W.

AUSTRALIA AND PACIFIC

NATIVE PEOPLES OF THE PACIFIC WORLD. By FELIX M. KEESING. (Pacific World Series.) *New York: Macmillan*, 1946. 8×5½ *inches;* xvi+144 *pages; sketch-maps and illustrations.* 15*s*

These useful little Pacific handbooks are sponsored by the American Committee for Wild Life Protection. During the war they were admirably suited for the use of members of the U.S. Forces suddenly plunged into a new world among Pacific islands, far from libraries. The size is convenient for slipping into a suitcase or haversack, and tourists and colonists alike will welcome the information which they will find to answer most of their queries. The immense field that Professor Keesing covers precludes his expanding the material, although eminently qualified to delve much more deeply. But this book suggests lines for further study, and will no doubt stimulate readers to acquire other works on any subject in which they are particularly interested. L. E. C.

PANGAI: a village in Tonga. By ERNEST and PEARL BEAGLEHOLE. (Memoirs of the Polynesian Society, 18.) *Wellington: Polynesian Society*, 1941. 9½×6 *inches;* 145 *pages; sketch-maps*

There are many angles from which the study of primitive races of human beings may be approached. Earlier writers were content to draw analogies between them and the more intensely intellectually trained races and to place the former on a lower rung of the ladder of evolution. But within the last century anthropologists have recognized that although the lives of native tribes appear to be simple in comparison with those under a complex form of civilization, yet their cultures are very highly developed. There is a fine network of interacting influences controlling their thoughts and actions which leave higher races unmoved. Some indeed are so subtle as to escape the perception of all but a few specially trained anthropologists. Even these appear to have considerable difficulty in some cases in expressing them in terms of modern psychology.

Therefore the authors of this delightful book were wise in restricting the field of their investigation. They spent two months in the Tongan Islands, seven

weeks of which they lived in the village of Pangai on Vavau, and made a detailed survey of the normal life of the community. There are specially interesting tables of a week's occupations of a man and a woman.

It is well to recall, as the authors remind us, that Tongans have always been accustomed to a form of administration under chiefs with definite responsibilities. This is of paramount importance in social development, and explains the unswerving loyalty of the Tongans to their Queen. These people are not dangerously isolated or static; they have survived contact with white races and retained their own culture while adopting certain customs and conveniences. The impression given is of a human group perfectly balanced with their surroundings, and as the island products have never roused the cupidity of other races it seems likely that they may remain so for centuries. The presentation of this village life as the authors saw it, and with as much revealed of the cultural structure as the villagers would permit, makes very interesting reading and contains a wealth of information. It is by such studies that mosaics are formed to give the complete picture. L. E. C.

AUSTRALIA, ITS RESOURCES AND DEVELOPMENT. By G. L. Wood. *New York: Macmillan*, 1947. $8\frac{1}{2} \times 6$ *inches;* xviii + 334 *pages; maps, diagrams, and illustrations.* 20*s*

This work is a symposium of twenty-one chapters contributed by eighteen authors, only three of whom would call themselves geographers. Every one of them however has a strong sense of geographical values; explicit reference to the character and influence of basic physical and climatic conditions is constantly made, and the volume might equally well have been entitled 'An economic geography of Australia.' Most of the chapters are short (about 3000 words), their quality is almost uniformly high, and the editor has succeeded in securing a unity and continuity of theme and treatment uncommon in such an assembly of independent essays. Except for two of the essays, which may date from the later stages of the recent war, all have been prepared since the end of the war, and for most British readers will be the first comprehensive and authoritative source of information on the effects of war-time developments. How many of us know, for instance, that Australia now produces pig iron and bar steel at just over half the cost of their production in England, and that this cost ratio has been maintained for almost a decade?

Where all the contributions are good, the reader's preferences are likely to be influenced by his special interests. The reviewer would like to mention particularly those chapters dealing with the agricultural and pastoral industries, with mineral resources, secondary industries, and the tariff, and the two final chapters on Australia's economic and strategic interests in the nearer Pacific. Some useful black and white sketch-maps (there might with advantage have been more of them) and twenty-four excellent half-tone illustrations complete the volume. R. O. B.

SOCIAL GEOGRAPHY

ECONOMICS OF MIGRATION. By Julius Isaac. (International Library of Sociology and Social Reconstruction.) *London: Kegan Paul, Trench, Trubner*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii + 285 *pages.* 18*s*

In the preface to this work, Sir Alexander Carr-Saunders recalls that during the past four centuries the people of Europe have overflowed into new continents and in some cases have become the sole inhabitants of such regions. There is a need for further historical study and for closer sociological analysis of these movements. Dr. Isaac's book is one contribution to this investigation; its aim

is to enquire into the possibility of achieving a more favourable distribution of the population and encouraging settlement in relatively sparsely populated regions.

The bibliography is vast and varied, even though only sources in the English language are listed, and the work covers so wide a range of topics that it would be difficult for an author to be equally competent in all. There are twenty chapters and well over a hundred sub-headings; for example in Chapter 5 on "The control of migration," one section deals with the "effects of large-scale emigration," which is further divided into discussions of Ireland, Italy and the former "depressed" areas of Great Britain. Apparently emigration may in some cases, as in Ireland, be beneficial; but what exactly is meant by the statement, "for Ireland the only limit to the usefulness of emigration was the optimum point of population, and there is no reason to assume that free migration could have ignored this mark"? Does the author mean, as he implies in the next paragraph, that the present tendency towards stability of population in Ireland (now about 4,250,000) is an indication that there has been sufficient emigration for the present, or at least that emigration should be reduced? Unfortunately the author does not say at what time Ireland was "a merely agricultural country with an extremely low standard of living, little division of labour, unable to withstand the competition of agricultural producers overseas on the export market after England's adoption of free trade, prevented from transferring to more capitalistic methods of production by lack of capital, continually threatened by famine."

This book should receive careful attention from students of population, though one is obliged to accept some of the author's conclusions with reserve, even when they are heralded by the phrase "experience shows that." Is it, for example, certain that (p. 50) "subarctic and arctic regions offer enormous potentialities for immigration provided that the immigrants can become acclimatized"? Sub-tropical regions have been successfully settled in Queensland, East Africa and South America, but the agricultural potentialities differ widely from those of sub-arctic and arctic regions. Many of the conclusions are interesting. It is clear that countries may help to relieve population pressure in various ways. The contribution of the United States may consist in promoting international trade and providing loans to over-populated or under-populated countries, rather than in admitting immigrants into her own territory. Again, Dr. Isaac states that "there is no reason to discard as fantastic the suggestion that Canada, Australia, New Zealand and most South American countries could attain a considerably higher standard of living if they would embark upon a policy of planned immigration with a view to doubling or trebling their population in a generation or so." The geographer may be sceptical but the author has at least shown the fascination of the problem. T. W. F.

GENERAL

MIDDLE EAST JOURNEY. By RICHARD GOOLD-ADAMS. *London: John Murray*, 1947. 9×6 *inches;* 195 *pages; illustrations and sketch-map.* 15*s*

This book sets out the experiences of an R.A.F. officer in the Middle East, between Christmas 1942 and Christmas 1943. It is obviously based on letters and a diary written at the time and the author has wisely preserved the personal note. His duties took him to Libya, Egypt, Petra, Baghdad, Kurdestan, Syria and Cyprus. The book is not of any special interest, but is marked by political common sense and is very pleasantly written. K. DE B. C.

ADDITIONS TO THE LIBRARY AND MAP ROOM

EUROPE

TOUR ON THE CONTINENT, 1765

By Thomas Pennant: edited by G. R. de Beer. (*Roy. Soc. Ser.* 132.) 9×6. xii +178 pp. *London: Quaritch*, 1948. 17*s* 6*d*

The first publication of a manuscript journal, preserved in the National Library of Wales. It is valuable for the author's accounts of the scientists whom he met.

PREHISTORIC BRITAIN

By Jacquetta and Christopher Hawkes. 8×5½. xvi+280 pp. Illustrations. *London: Chatto and Windus*, 1948. 15*s*

The prehistory of Britain from 'eoliths to the Romans.' The Appendix is a guide, on a regional basis, to prehistoric and Roman sites, with brief indications of their significance.

SOME ASPECTS OF BRITISH CIVILIZATION

By H. J. Fleure. (*Frazer Lecture*, 1947.) 9×6. 32 pp. *Oxford: Clarendon Press*, 1948. 2*s* 6*d*

A survey of the regional aspects of British history, and of the extent to which they are manifest to-day.

KENT

By Richard Church. (*The County Books.*) 9×6. xii+290 pp. Illustrations. *London: R. Hale*, 1948. 15*s*

GEOLOGY OF THE ANCIENT ROCKS OF CHARNWOOD FOREST, LEICESTERSHIRE

By W. W. Watts. 9×5½. 160 pp. Maps and illustrations. *Leicester: E. Backus*, 1947

THE MOUNTAINS OF SNOWDONIA IN HISTORY, THE SCIENCES, LITERATURE, AND SPORT

Ed. by H. R. C. Carr and G. A. Lister. 2nd ed. 9×5½. xiv and 312 pp. *London: Crosby Lockwood*, 1948. 15*s*

First published in 1925: now revised with additional chapters.

HIGHWAYS AND BYWAYS IN THE CENTRAL HIGHLANDS

By Seton Gordon, with illustrations by Sir D. T. Cameron. 8×6. xvi+420 pp. *London: Macmillan*, 1948. 10*s* 6*d*

TULLAMORE AND ITS ENVIRONS, CO. OFFALY

By T. W. Freeman. (*Irish Geography*, 1 (1948) 133–50)

BALTIC BACKGROUND

By Bernard Newman. 8½×6. 280 pp. Illustrations. *London: R. Hale*, 1948. 16*s*

A commentary on events in the Baltic countries from 1939–45.

KØBENHAVN FRA BISPETID TIL BORGERTID: BYPLANMÆSSIG UDVIKLING TIL 1840

Ed. by Stadsingienørens Direktorat. 13×10. xii+304 pp. Maps and illustrations. *Copenhagen*, 1947

A detailed study of the development of the town plan of Copenhagen from the twelfth century to 1840, prepared by the Town Planning Dept. The work is well illustrated by numerous maps and plans.

LA STRUCTURE TECTONIQUE DU BASSIN DE MONS; SES ENSEIGNEMENTS ET SES PROBLÈMES

By C. Stevens. (*Bull. Soc. Belge Géol.* 56 (1947) 424–76)

LE PORT DE BORDEAUX APRÈS LA LIBÉRATION

By A. Grange. (*Cahiers d'Outre-mer, Bordeaux*, 1 (1948) 14–27: illustrations)

LA CHEMIN DE FER DE L'EST DE LYON

By M. A. Carron. (*Etudes Rhodanien*, 23 (1948) 25–53; sketch-maps)

NEDERZETTINGSVORMEN EN-PROBLEMEN IN DE GROOTE HONGAARSCHE LAAGVLAKTE

By A. N. J. den Hollander. 10×7. 188 pp. Maps and illustrations. *Amsterdam: J. M. Meulenhoff*, 1947. 12.50 guilders

A study of settlement forms on the Alföld, particularly of the *tanya*, or isolated farm house, and the accompanying social problems.

REGIONE AGRARIE DELL' EMILIA E ROMAGNA

By G. Merlini. (*Universo*, 28 (1948) 257–72; map)

LA FITTEZZA DEL RETICOLATO IDROGRAFICO NELL' APPENNINO TOSCO-EMILIANO

By Bruno Nice. (*Riv. Geogr. Ital.* 55 (1948) 65–98; sketch-maps)

Study of the density of the hydrographical net, and its relation to the geology, etc.

LA DEGRADAZIONE DELLE MONTAGNE, CON ESEMPLIFICAZIONE NELL' ALTA VAL DI SUSA

By F. Sacco. (*Universo*, 28 (1948) 129–151; illustrations and folding-map)

NUOVE OSSERVAZIONI SUI GHIACCIAI DEL CANIN E DEL MONTASIO

By D. di Colbertaldo. (*Universo*, 28 (1948) 165–85; maps and illustrations)

ENKELE BESCHOUWINGEN OVER DE RIVIER-TERRASSEN IN NEDERLAND

By P. Tesch. (*Tijds. K. Nederl. Aardr. Gen.* 65 (1948) 141–52)

KULTURGEOGRAFISKA STUDIER I STOCKHOLMS NORRA SKÄRGÅRD

By A. L. Kristiansson. (*Geogr. Annaler*, 29 (1947) 48–127: maps and diagrams; English summary)

Deals mainly with 17th cent. settlement and agriculture.

LE MASSIF DE STRANCA

By H. N. Pamir et F. Baykal. (*Bull. Geol. Soc. Turkey*, 1 (1947) 7–43. In Turkish; French summary)

An old cristalline massif in Northern Thrace.

YUGOSLAVIA

By John Morris. (*Citizen of the world series.*) $8\frac{1}{2} \times 5\frac{1}{2}$. viii+116 pp. Sketch-maps. *London: St. Botolph Publ. Co.*, 1948. 5*s*

An account of the political and economic changes since 1939, with statistics, and rather crude sketch-maps.

ASIA

THE BACKGROUND OF ISLAM: being a sketch of Arabian history in pre-Islamic times

By H. StJ. B. Philby. $10 \times 6\frac{1}{2}$. 152 pp. *Alexandria: Whitehead Morris*, 1947

IN THE HIGH YEMEN

By Hugh Scott. 2nd ed. $8\frac{1}{2} \times 5\frac{1}{2}$. xx +260 pp. Maps and illustrations. *London: John Murray*, 1947. 18*s*

THE PRE-WAR POPULATION OF CHINA: distribution and density

By J. W. Alexander. (*Ann. Assocn. Amer. Geogr.* 38 (1948) 1–5; map)

HOOFDLIJNEN VAN DE PLANTENGEOGRAFIE VAN DE INDISCHE ARCHIPEL

By C. G. G. J. van Steenis. (*Tijds. K. Nederl. Aardr. Gen.* 65 (1948) 193–208)

GEOLOGICAL EXPLORATIONS IN THE ISLAND OF CELEBES

By commission of the Netherlands East Indies Geological Survey in 1929, with the collaboration of W. H. Hetzel and H. E. G. Straeter under leadership of H. A. Brouwer: Geological summary and petrography. $10 \times 6\frac{1}{2}$. 346 pp. Maps and illustrations. *Amsterdam: North Holland Publ. Co.*, 1947. £3 3*s*

PROSPECTS AND POTENTIALITIES OF PAKISTAN

By M. B. Pithawalla. 8×5. 42 pp. *Karachi*, 1947

Reprint of a series of newspaper articles. The author favours Rawalpindi as the best city for the capital.

IRAN: an economic study

By Raj Narain Gupta. (*Indian Inst. of Internat. Affairs.*) $8\frac{1}{2} \times 5$. 170 pp. Illustrations. *New Delhi*, 1947. 8*s* 6*d*

UNE RECONNAISSANCE GÉOGRAPHIQUE AU SINAI

By Emm. de Martonne. (*Ann. de Géogr.* 56 (1947) 241–64; illustrations)

LES RÉSEAUX HYDROGRAPHIQUES EN TURQUIE

By I. Hakki Akyol. (*Türk Coğr. Dergisi*, 3 (1947) 1–36; maps and diagrams: In Turkish; French summary)

ZONES D'ALTITUDE DE LA TURQUIE: détermination et interpretation

By A. Tanoğlu. (*Türk Coğr. Dergisi*, 3 (1947) 37–63: In Turkish; French summary)

UBER DIE TEKTONIK DES ULUDAĞ-MASSIVS

By I. Ketin. (*Bull. Geol. Soc. Turkey*, 1 (1947) 60–88: In Turkish; German summary)

AFRICA

QUELQUES ASPECTS PHYSIQUES DU CONGO BELGE

By E. Polinard. (*Bull. Soc. R. de Géogr., Anvers*, 61 (1946–7) 181–215)

LES FORMES DE RELIEF DES ENVIRONS DE COQUILHATVILLE

By G. LeClercq. (*Bull. Soc. R. de Géogr., Anvers*, 61 (1946–7) 142–59)

L'ORGANISATION NOUVELLE DU RÉSEAU ET DES RECHERCHES MÉTÉOROLOGIQUES AU CONGO BELGE

By E. A. Bernard and B. B. P. Vander Elst. (*Bull. agric. Congo Belge*, 39 (1948) 77–100; maps)

LES POISSONS, LEUR MILIEU ET LEUR PÊCHE AU BIEF SUPÉRIEUR DU LUALABA

By M. Poll and H. Renson. (*Bull. agric. Congo Belge*, 39 (1948) 427–46)

THE DEVELOPMENT OF CENTRAL AND SOUTHERN AFRICA

By J. D. Rheinallt Jones. (*S. African Journ. Sc.* 44 (1948) 75–91)

MIGRANCY AND URBANISATION IN THE UNION OF SOUTH AFRICA

By G. E. Stent. (*Africa*, 18 (1948) 161–83)

ROOIYARD: a sociological survey of an urban native slum yard
By Ellen Hellmann. (*Rhodes-Livingstone Papers*, 13 (1948) 126 pp., illustrations)

A detailed study of life in a Johannesburg slum.

THE OLIPHANTS' RIVER IRRIGATION SCHEME
By Elizabeth H. Mogg. (*Africa*, 18 (1948) 199–204)

NORTH AND SOUTH AMERICA

CANADA MOVES NORTH
By Richard Finnie. $8\frac{1}{2} \times 5\frac{1}{2}$. 192 pp. Illustrations. *London: Hurst and Blackett*, 1947. 21*s*

Written to correct popular misconceptions about the N.W.T.; also discusses position of Eskimo.

CANADIAN AGRICULTURAL POLICY: the historical pattern
By V. C. Fowke. 9×6. xii+304 pp. *Toronto: Univ. Press*, 1947. 30*s*

The theme of this work is that the political power of Canadian farmers has varied in proportion to the contribution of agriculture to commerce, finance, and industry, and not to their numbers or the strength of their organization.

GLACIATION IN NORTH CENTRAL BRITISH COLUMBIA
By J. E. Armstrong and H. W. Tipper. (*Amer. Journ. Sc.* 246 (1948) 283–310; illustrations and maps)

FISHERY RESOURCES OF THE UNITED STATES
Ed. by Lionel A. Walford. 12×9. vi+134 pp. *Washington, D.C.: Public Affairs Press*, 1947. $5.00

GEOLOGIC NOTES ON ADAK ISLAND AND THE ALEUTIAN CHAIN, ALASKA
By C. C. Bradley. (*Amer. Journ. Sc.* 246 (1948) 214–40; sketch-maps and illustrations)

There is evidence for three periods of volcanism, one being post-glacial. The active belt appears to have shifted progressively northwards.

BRITAIN AND THE WEST INDIES
By Agnes M. Whitson and Lucy F. Horsfall. $7 \times 5\frac{1}{2}$. 88 pp. Illustrations. *London: Longmans, Green*, 1948. 1*s* 6*d*

LE NORD-EST DU BRÉSIL
By G. Lasserre. (*Cahiers d'Outre-Mer*. 1 (1948) 40–67)

POLAR REGIONS

ARCTIC CONDITIONS AND WORLD WEATHER
By Sir Gilbert Walker. (*Q. Journ. R. Meteorol. Soc.* 73 (1947) 226–56)

THE SEARCH FOR THE NORTH MAGNETIC POLE
By R. Glenn Madill. (*Arctic; Journ. Arctic Inst. N. America*, 1 (1948) 8–18)

IN EIS UND STURM
By C. H. Pollog and E. Tilgenkamp. Vol. I. $8\frac{1}{2} \times 6$. 312 pp. Illustrations. *Zurich: Air Editions*, 1946

Chapters in the history of Arctic exploration, tending rather to stress sensational aspects, from the Norseman to the drift of the *Sedov*, 1937–40.

LA GRAVIMÉTRIE ET L'EXPÉDITION ARCTIQUE
By J. Martin. (*Expedns. polaires franç. P. E. Victor*, 1948, 13 pp.)

LA MUSIQUE DES ESQUIMAUX-CARIBOUS
By Z. Estreicher. (*Bull. Soc. Neuchatel. de G.* 54 (1948) 1–54)

THE STRATIGRAPHY AND TECTONICS OF KNUD RASMUSSENS LAND AND THE KANGERDLUGSSUAQ REGION
By L. R. Wager. (*Med. om Grønland*, 134 (1947) No. 5, 64 pp.; maps and plates)

DESCRIPCION GEOGRÁFICA DE LA ANTÁRTICA
By E. Flores Silva. (*Memorial Tecnico, Chile*, 15 (1947) 231–52)

GENERAL

NAVIGATION AND ASTRONOMY FOR STUDENTS
By Ivan E. Allison. 9×6. 440 pp Diagrams and charts. *London: Harrap*, 1948. 25*s*

MODERN INFLUENCES ON THE UNIVERSITY ASPECT OF PROFESSIONAL TRAINING IN SURVEYING: an inaugural lecture
By C. A. Hart. $8\frac{1}{2} \times 5\frac{1}{2}$. 24 pp. *London: H. K. Lewis*, 1948

GEOGRAPHY AND AIR PHOTOGRAPHS
By D. L. Linton. 10×6. 32 pp. *Manchester: Geogr. Assocn.*, 1947. 1*s* 8*d*

Reprints of three articles from *Geography* on use of air photographs n education.

EARTH, MOON, AND PLANETS
By F. L. Whipple (*Harvard Books on Astronomy*). $8\frac{1}{2} \times 6$. vi+294 pp.; illustrations. *London: Churchill*, 1946. 18*s*

LES MÉANDRES DES RIVIÈRES
By M. Pardé. (*Rev. G. Pyrenées*, 16–17 (1945–46) 67–88)

AN APPROACH TOWARDS A RATIONAL CLASSIFICATION OF CLIMATE
By C. W. Thornthwaite. (*Geogr. Rev.* 38 (1948) 55–94; maps)
Based upon the relation of potential evapotranspiration to temperature and rainfall.

DEVELOPMENT OF AIR TRANSPORT DURING THE WAR
By Sir Ralph Cochrane (*J. R. Aeronaut. Soc.* 51 (1947) 284–424; maps)

THE BRITISH EMPIRE
Ed. by Hector Bolitho. (*British Heritage Series.*) 9×6. x+246 pp. Maps and illustrations. *London: Batsford*, 1948. 21*s*
A series of essays by various writers, emphasizing recent developments and possible trends. The limited space hardly allows adequate treatment of all aspects. Interesting illustrations.

ATLASES AND MAPS

ATLANTE GEOGRAFICO ZANICHELLI AD USO DELLE SCUOLE. Redatto do Giuseppe Nangeroni e Leonardo Ricci. *Bologna: Nicola Zanichelli*, 1947
Contains 139 pages of physical and economic maps, size 13 by 9 inches.

ATLAS DU XX^e SIÈCLE. R. et M. Ozouf. *Paris: Fernand Nathan* [1948]
71 plates of maps and 600 photographic illustrations.

COLLINS - LONGMANS CLARION ATLAS. *London: Wm. Collins Sons & Co., Ltd., and Longmans, Green & Co., Ltd.*, 1948. Price 3*s*

PHILIPS' NEW SCHOOL ATLAS. 38th ed. Edited by George Goodall, M.A. *London: George Philip & Son, Ltd.*, 1947. Price 6*s*

THE WORLD. Equatorial scale 1: 30,000,000. *New York: American Geographical Society*, 1947

WORLD. The "Time and Tide" Map of the United Nations by MacDonald Gill. *London: George Philip & Son, Ltd.*, 1948

ADMIRALTY CHARTS. 25 New Charts; 18 New Editions; 57 Charts that have received Large Corrections; 21 "Decca" Lattice Charts. *London: Hydrographic Department, Admiralty*, 1947–48

DUNKIRK TO BERLIN, June 1940–July 1945. Journeys undertaken by The Rt. Hon. Winston S. Churchill. By Lieut.-Comm. Frank A. de Vine Hunt, R.N.V.R. *London: George Philip & Son, Ltd.*, 1947

EUROPE

GREAT BRITAIN. ORDNANCE SURVEY 1: 25,000. Provisional Edition. 120 sheets. *Chessington*, 1948

GREAT BRITAIN. ORDNANCE SURVEY. Six-inch Map with additions in 1938. 168 sheets. *Chessington*, 1947–48

GREAT BRITAIN. Geological Map of Scotland and the North of England, 1: 625,000. *London: Geological Survey*, 1948

SCOTLAND. ORDNANCE SURVEY. Popular edition. One-inch Map. 36 sheets. *Chessington*, 1948

NORTHERN IRELAND. LAND UTILISATION SURVEY. 1: 63,360. Sheets: North Derry; North Antrim; Mid-Antrim; Mid-Down. *Belfast: Land Utilisation Survey of Northern Ireland*, 1948

Eire. International Map of the World, 1/1M. Sheet N.N–29 (Dublin). Editions in English and Irish. *Dublin: Ordnance Survey Office*, 1940

FRANCE. CARTE DES CANAUX DE FRANCE ET BELGIQUE. 1/1M. *Paris: Girard et Barrère*, 1947

FRANCE. CARTE DES CHEMINS DE FER FRANÇAIS, 1: 800,000. *Paris: Institut Géogr. Nat.*, 1944–45

HOLLAND. KLEINE GEOLOGISCHE OVERZICHTSKAART VAN NEDERLAND. 1: 600,000. *Haarlem: Geologische Stichting*, 1947

NORWAY. TOPOGRAFISK KART OVER KONGERIGET NORGE 1: 100,000. Sheets 47C, Y4, Z2. *Oslo: Norges geografiske Opmaaling*, 1945

POLAND. MAPA POLSKI 1: 500,000. 12 sheets; Mapa Polski 1: 1,000,000. Layered and unlayered editions. *Warsaw: Military Geographical Institute*, 1947–48

ATLAS POLSKI WSPÓLCZESNEJ. E. ROMER I J. WASOWICZ. *Wroclaw: Ksiaznica-Atlas*, 1948
Atlas of contemporary Poland with physical and economic maps on 1/5 M. and 1/10 M. scales.

POLAND. GEOLOGICAL MAP OF POLAND 1 : 300,000. Sheet: Kolobrzeg 1 : 25,000. Sheet: Zabkowice editions A and B. *Warsaw: Geological Survey of Poland*, 1947

POLAND AND ADJACENT COUNTRIES. Edited by Dr. B. Zaborski. 1/1M. Published under the auspices of the Association of Polish University Professors and Lecturers in Great Britain, 1948

PORTUGAL. ARISTIDES DE AMORIM GIRÃO. ATLAS DE PORTUGAL. *Coimbra: Universitd de Coimbra*, 1941

SWITZERLAND. CARTE GÉOLOGIQUE GENERALE DE LA SUISSE 1 : 200,000. Sheets: 1, 2, 6. *Berne: Commission Géol. Soc. Helvétique des Sc. Nat.*, 1942–44

ASIA

AZJA. E. ROMER. 1 : 10,000,000. *Wrocław and Warsaw: Książnica-Atlas*, 1947
Physical wall-map of Asia.

BURMA CHARTS. Rangoon Harbour Wharves, and Moorings. 1 : 3,600; Sheet No. 1, Rangoon Harbour 1 : 12,102. *Rangoon: Commissioners for the Port*, 1947

PALESTINE. TOPO-CADASTRAL SERIES 1 : 20,000. 7 sheets. *Jaffa: Survey of Palestine*, 1943–47

SYRIA. CARTE GÉOLOGIQUE DU MOYEN ORIENT. 1 : 2,000,000, Carte Géologique de la Syrie et du Liban. 1 : 1,000,000, Carte Lithologique de la Syrie et du Liban. 1 : 1,000,000, Dressée par Louis Dubertret. *Beirut: Service Géographique de F.F.L.*, 1942–45

AFRICA

East African Territories. Compiled by the Royal E. African Automobile Assocn. 1/2M. *London: Sifton Praed & Co., Ltd.*, 1948. Price 10*s*

CARTE GÉOLOGIQUE DE RECONNAISSANCE DE L'AFRIQUE OCCIDENTALE FRANÇAISE 1 : 500,000. Sheets: Kindia-Ouest, Kita-Ouest. *Dakar: Service des Mines de l'A.O.F.*, 1944

NIGERIA. LAGOS-KANO AIR ROUTE. 1/1M. *Lagos: Land and Survey Department*, 1943

NIGERIA. PLAN OF LAGOS. 1 : 4,800. *Lagos: Land and Survey Department*, 1942

UGANDA PROTECTORATE. 1 : 500,000. 2 sheets; 1 : 250,000 7 sheets; 1 : 12,500 2 sheets; 1 : 10,000 3 sheets. *Entebbe: Survey, Land and Mines Department*, 1939–47

NORTH AMERICA

NORTH AMERICA. 1 : 10M. *Edinburgh: John Bartholomew & Son, Ltd.*, 1948. Price 6*s* 6*d* mounted
A political map; no relief shown

CANADA. National Topographic Series 1 : 63,360. Sheets: 31 F/2, 31 F/5, 31 I/10. *Ottawa: Dept. of Mines*, 1947–8

BRITISH COLUMBIA. Degree Sheet Series 1 : 126,720. Sheet: Lardeau. *Victoria: Dept. of Lands*, 1947

UNITED STATES. U.S. Geological Survey, Quadrangle sheets: 1 : 24,000 123 sheets; 1 : 30,000 7 sheets; 1 : 31,680 53 sheets; 1 : 62,500 56 sheets; National Historic Sites: Home of Franklin D. Roosevelt 1 : 960, Vanderbilt Mansion 1 : 3,600. *Washington: U.S. Geological Survey*, 1947–48

UNITED STATES TRANSPORTATION MAPS. Highways, Railroads, Canals, Air Lanes and Dredged Channels. 1 : 250,000. 239 sheets. *Washington: Federal Works Agency*, 1940–47
These sheets of uniform size cover 27 States

CENTRAL AND SOUTH AMERICA

ANTIGUA TOWN PLAN 1 : 10,000 St. Johns. *Teddington: Directorate of Colonial Surveys*, 1947

BARBADOS. BRIDGETOWN 1 : 10,000. *Teddington: Directorate of Colonial Surveys*, 1948

JAMAICA 1 : 50,000. Sheet: Port Maria–Buff Bay. *Teddington: Directorate of Colonial Surveys*, 1948

ARGENTINA. CARTA AERONÁUTICA DE LA REPÚBLICA ARGENTINA 1 : 1,000,000. Sheets: 12, 16. *Buenos Aires: Instituto Geográfico Militar*, 1948
Completion of this map in 16 sheets.

LOGBOOK FOR GRACE. Messrs. Robert Hale have informed us that they will be publishing an English edition of R. C. Murphy's 'Logbook for Grace' in October, price 15*s*. In Great Britain, all enquiries for the book should be addressed to Messrs. Robert Hale. 'Logbook for Grace' was reviewed in our last issue (*Geogr. J.* 111 (1948) 127–8).

THE SOCIETY'S NEWS

AWARD OF GEOGRAPHICAL ESSAY PRIZES

On the recommendation of the examiners, the Council have this year awarded two Geographical Essay prizes of £10 each: to Mr. John L. Jenness of Cambridge (now of the Geographic Bureau, Department of Mines and Resources, Canada) for an essay on "Permafrost in Canada," and to Miss Helen Wallis of St. Hugh's College, Oxford for an essay entitled "An application of the principles of regionalism to the study of English administrative units." Normally only one Geographical Essay prize is offered each year, to students reading for an Honours degree in Geography at a university of Great Britain or Northern Ireland for either a critical survey of recent additions to knowledge in a limited geographical field or a discussion of some current problem in its geographical aspects. Essays submitted for the next award should reach the Director and Secretary not later than 31 December 1948.

R.G.S. STAFF

Mr. Alfred Stephenson, the Society's Instructor in Surveying, has recently been appointed Reader and Assistant Professor in Surveying at the Imperial College of Science and Technology, South Kensington, where he was formerly a lecturer. The appointment is antedated to have effect as from 1 October 1948.

Mr. Frank George has joined the staff of the Society as Research Assistant to the Librarian. Mr. George is a graduate of Cambridge University with an Honours degree in Natural Science and Geography (1929), and was with the Indian Civil Service in Burma from 1930 till earlier this year.

SOME RECENT MAPS IN THE SOCIETY'S COLLECTION

The American Geographical Society have published for the U.S. State Department a useful and attractive map of the world on the modified Mercator projection devised by Mr. O. M. Miller and explained in the *Geographical Review* 32 (1942) 424. By slightly modifying the formula for the spacing of the parallels of latitude, the distortion in the northern and southern areas is reduced, and between the parallels of 45° north and south the departure from the Mercator is scarcely significant. The equatorial scale is 1/30M., and the map is bounded by the parallels of 85° N. and 70° S. On the reverse is printed a graticule from which great circle courses and distances can be plotted. Relief is shown by layers in six colours, and the number of names has been kept down to avoid overcrowding. Recent *de facto* changes in boundaries are indicated, also trusteeship areas in the Pacific and elsewhere.

An interesting map recently received is the "Map of the Northern Hemisphere north of 39° 30′ showing topography" published by the Aeronautical Chart Service of the Army Air Service, Washington, in four sheets. It is on the stereographic polar projection, the scale being true along the parallel of 65° N., that is, 1 inch to 100 miles. At latitude 40° the scale is 16·1 per cent. too great. The land surface, with the exception of ice and snow areas, is yellow with contours "essentially form lines" in brown, and surveyed and unsurveyed features are differentiated. Special attention has been given to communications and important railways, roads and trails are clearly indicated. This is perhaps the most useful general map of the Arctic which has appeared.

Messrs. John Bartholomew's layer-coloured map of Australia (1/5M.) is the

best general map available. Much work has been done in compiling material particularly for the topography, and the representation of the relief of the centre of the continent is an advance on existing maps of this type. It is also useful for its delineation of the transcontinental highway and the associated roads and tracks.

The final sheet of the 1/50,000 map of Jamaica, provisional edition, has been published by the Directorate of Colonial Surveys. This is the first complete survey of the island on a medium scale. The style is bold and clear; contours are at 50, 100 and 250 feet and then at 250-foot intervals; main roads are in red, forests in solid green, scrub in light green and plantations in green symbols.

The Society has also received the first sheet, Sørkapp, of a new topographical map of Svalbard, produced by the Norges Geografiske Oppmåling for Norges Svalbard-og-Ishavs-Undersøkelser. The series is on a scale of 1/100,000, and has been drawn by stereogrammetry from oblique air photographs. This will be the first comprehensive map of the archipelago on a topographic scale. The relief of the ice-free land is shown by contours in brown at 50-metre intervals with oblique shading, the glaciers by blue form lines and green shading. The glacier fronts are as in 1936. The general effect is clean and fresh. G. R. C.

THE RECORD

THE EMPTY QUARTER: ADJUSTMENT TO MR. THESIGER'S MAP

Since the publication of the map of the eastern Rub' al Khali (*Geogr. J.* 111 (1948) facing p. 152) Mr. Thesiger's more recent journey from Laila to Sharja has shown a considerable difference in the position of Liwa. While investigating this error, information was kindly given by the Iraq Petroleum Company whose aerial survey of the area extends over Mr. Thesiger's traverse to the south-east of wadi al'Ain and gives new positions for Jabal Kaur, Jabal Salakh and Jubail al Fuhud. These features have been identified by Mr. Thesiger on the air survey map with the result that a fairly large adjustment is necessary to his map in the *Journal*.

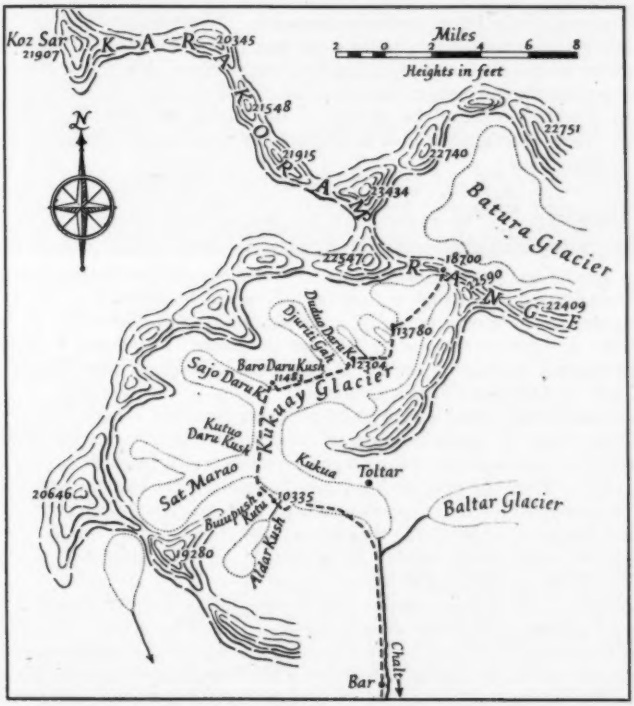
Jabal Kaur, the position for which was taken from Sir Percy Cox's map (*Geogr. J.* 66 (1923) facing p. 288), is now placed by the Iraq Petroleum Company's air survey at 23° 10′ N., 57° E. As this is a control point used in plotting Mr. Thesiger's traverse through the Rub'al Khali, it affects the whole of the traverse north of Mughshin (where he first entered the sand sea) and east to Jabal Mazka Kabir which is Bertram Thomas's "Table Mountain." This new position for Jabal Kaur alters the position for Bir Balagh in Liwa to within five miles of the new position obtained by Mr. Thesiger when he visited it again on his more recent journey, at approximately 23° 05′ N., 53° 35′ E. His camp in wadi al'Ain is now placed at 22° 45′ N., 56° 03′ E.

Mr. Thesiger's journey south-east from wadi al'Ain is controlled by his rays on Jabal Kaur and Jabal Salakh. The air survey position for the latter causes a considerable but constant swing in his traverse, placing his camp near Hashi well at 21° 06′ N., 58° 19′ E. This position however is improbable as his journey south from here to Jabal Mazka Kabir would require a compass deviation of about 45° and a traverse distance longer than estimated, and would place him practically on the coast instead of 20 to 25 miles inland. It is therefore more reasonable to accept Mr. Thesiger's position for Hashi camp at 20° 50′ N.,

57° 40′E. (the position originally obtained by bearings from Hashi to Jabal Mazka Kabir) and to swing his traverse between this point and the new position for his camp in wadi al'Ain, giving an intersection for Jabal Salakh at 22° 16′ N., 57° 16′ E. K. C. JORDAN

MAPPING THE KUKUAY GLACIER, KARAKORAM

We have received from Hr. Hans Gyr of Zurich a sketch map, reproduced here, of the Kukuay glacier north of Chalt in the western Karakoram (approximately 36° 35′ N., 74° 15′ E.; Survey of India sheet No. 42 L, Baltit (Hunza)) which was previously unexplored. Hr. Gyr mapped the glacier during an expedition to the western Karakoram in the summer of 1947, in company with



Kukuay glacier, western Karakoram

Mr. H. W. Tilman, Mr. C. H. Secord and Hr. R. Kappeler. They found the glacier to cover only about half the area that had been supposed, leaving an interesting area to the north-north-west still to be explored. This seems likely to affect the configuration on the published map of a considerable area to the west.

The only European previously to have visited the Kukuay was Colonel R. C. F. Schomberg, who explored the lower part of the glacier in 1933 (*Alpine J.* 46 (1934) 136–8).

DANISH EXPEDITIONS TO PEARYLAND

The photographs reproduced opposite and overleaf are taken from the fine colour film of the 1947 Danish expedition to Pearyland which was shown with a commentary by Mr. Ebbe Munck at a meeting of the Society on 16 February 1948. The expedition was mainly concerned with air reconnaissance, hut building and preliminary scientific work in preparation for the larger expedition which is now at work in Pearyland under the leadership of Count Knuth. The special interest of the 1947 expedition was the reliance on aircraft for carrying men, materials and dogs from the southern base on Young Sound, 74° N., to the northern base which was established on Brønlund Fiord, 82° N., an inlet of Independence Fiord. Two Catalina flying-boats of the Royal Danish Navy were used and two successful landings were made in Pearyland, where much more open water was found than had been expected. The scientists discovered a rich field for investigation in this isolated ice-free region with its distinctive flora. A number of interesting problems connected with the origin and survival of plant species, the migration of the fauna, ice behaviour in relation to the measured amelioration of the climate of the Arctic, the discovery of several former Eskimo settlements and so on, remain to be studied in detail by the present expedition.

UNIVERSITY NEWS

UNIVERSITY OF ABERDEEN

The session has been marked by a series of distinguished visitors whom we have been pleased to welcome in the north: Emeritus Professor E. G. R. Taylor, who spoke on "Tudor geography"; the Rector of the University of Lyons (Professor A. Allix) who spoke on "Human geography"; Professor A. Milon on "The economic geology of Armorica"; Captain E. Mikkelsen on "Greenland" and Dr. N. E. Odell on "British Columbia."

Structural work is well advanced on new premises near King's College, Old Aberdeen. Entry is promised during next session and this will break the association of geography with long flights of stairs which has hitherto prevailed at Aberdeen. While the year has been one of consolidation, one unfortunate step must be recorded: the Observatory at King's College, from which this Department has had invaluable help in the meteorological instruction, has had to close owing to the space being needed for university purposes and the spoiling by building of the recording site.

A pamphlet collection is being formed as part of the class library, the nucleus of the collection having been donated by Mr. John Macfarlane. Work is also in progress on a subject card-index of works and articles of geographical interest in the main University Library which has a considerable collection of pre-1800 atlases and treatises on survey. With greatly expanded classes, most activity has perforce been directed to undergraduate teaching. Students in Aberdeen can read Geography for the B.Sc. as well as the M.A. degree, and increasing numbers are entering the Faculty of Science though the majority still favour a degree in Arts. Field classes have been held at the week-ends; and in addition, some fifty students were present at an Easter vacation excursion to Carbisdale Castle, Ross-shire.

Following the recent creation of a Department of Soil Science in the University, a special course in this subject has now been arranged to form an integral part of the Honours course in geography. A. C. O.

Danish Pearyland Expedition, 1947. Looking towards Clavering Island from southern base on Young Sound

Summer vegetation, Young Sound

Denmark Fiord, seen on the flight to Pearyland

Brønlund Fiord, Pearyland, the expedition's northern base

UNIVERSITY OF DUBLIN (TRINITY COLLEGE)

The developments in Dublin since the previous note appeared (*Geogr. J.* 108 (1946) 262) have included the creation of a lectureship for Mr. J. P. Haughton, M.A., M.SC., and the appointment of a research assistant to the Reader, Miss D. V. Henning, B.A. The main problem of the Department is space, but reconstructions inside the Museum Building will eventually provide more adequate accommodation for both geology and geography, without altering in any way the external appearance or the marble-pillared hall of a building architecturally famous for its Venetian Byzantine form and for the admiration of Ruskin. So far geography has acquired the use of an additional lecture room and periodic access to a large theatre. Meanwhile the acquisition of equipment continues, and special attention is being given to the collection of every pamphlet on Ireland that may be useful now or in future years as source material for research workers. The main research now in progress is the historical geography of pre-Famine Ireland, about 1841. Other studies recently completed or in late stages include the past and present limits of cultivation in the Wicklow mountains; glacial and glaci-fluvial deposits near Dublin; the social geography of the city of Dublin, and the regions of circulation of local newspapers in Ireland. This last most entertaining investigation has been planned on the inspiration of Mr. A. E. Smailes' interesting papers on the delimitation of "urban fields," and of the annual local studies of the Geographical Society of Ireland.

Dublin University now has a student population of 2000 in place of 1400–1500 before and during the war. This includes a number of ex-Service men and women and some British students who came to Dublin from choice or failure to find a place in a British university. Some 250 students take courses in geography. The numbers in the Department have been rising steadily for years, but unfortunately few of the graduates remain in Eire where their work as geography specialists is very much needed.

Recent visitors to the Department have included Professor Dudley Stamp, whose effective lectures at the Royal Dublin Society caused local planners to pause and think though their outlook remains primarily architectural. Professor Walter Fitzgerald came to Dublin in May 1948 and gave lectures, followed by lively discussions, to large student audiences on the philosophy of geography and on Soviet Russia. It is hoped to welcome other British geographers as visiting lecturers in the future. Outside contacts have also been maintained through Oxford University's departmental tour of Cork and Killarney, the leadership of which was shared by Mr. Haughton with Mr. Martin and Mr. Paget. Bedford College students visited Glendalough, Co. Wicklow, with Dr. Smee and Mr. Mountjoy and were shown the splendour and squalor of Georgian Dublin, together with Trinity College, by the writer of this note. T. W. F.

UNIVERSITY COLLEGES IN THE COLONIES

Several university colleges are being set up in the colonial empire and have either been already accepted into the scheme of special relationship with the University of London, as described in the Report of the Asquith Commission on Higher Education in the Colonies, or are expected to make application for admission to this scheme in the near future. They are situated in East and West Africa, the West Indies and the Sudan. In the near future there will probably be vacancies for members of the geography staffs in Nigeria, Gold Coast and Jamaica and these will be advertised in the public press. Particulars may also be obtained from the Secretary of the Inter-University Council for Higher Education in the Colonies, 8 Park Street, London, W.1. L. B.

PROFESSOR GRIFFITH TAYLOR IN AUSTRALIA

Professor Griffith Taylor of the University of Toronto has recently spent three months in Australia as the guest of the new Australian National University at Canberra. In addition to giving a large number of geographical lectures at the six university centres, Professor Taylor advised on the setting up of research organizations for Land Utilization and Pacific Affairs.

A YEAR OF CHANGE: TERRITORIAL REORGANIZATION IN THE INDIAN UNION

The minuteness, fragmentation and sub-division of holdings have long been recognized as one of the primary curses of the Indian cultivator. At the other end of the social scale the innumerable petty princes have produced much the same results. According to a White Paper issued by the Government of India (the writer has seen an advance copy through the courtesy of Miss Thorne, Librarian at India House) there were on 14 August 1947 no less than 584 Indian states; the rulers of well over 200 of these were fully autonomous, while many of the rest were no more than local magnates exercising varying degrees of jurisdiction over statelets and estates, in varying grades of semi-feudal subordination either to other princes or to the Crown representative. Altogether the Indian States in 1941 covered 715,964 square miles with 93,189,238 people. But states with over 5000 square miles or 1,000,000 people numbered only 22; these accounted for 464,497 square miles and 59,864,378 inhabitants. On a generous estimate, therefore, the remainder had average areas of 500 square miles and populations of 65,000. The states ranged in size from the giants Kashmir and Hyderabad, with areas of 82,000 square miles each and populations of 4 and 16·3 millions respectively, to the 22 statelets of the Pandu Mewas in Gujarat which averaged 3 square miles and 1100 people. Administration was further complicated by fragmentation; Baroda, for instance, having four large and some thirty small enclaves totalling 8176 square miles, with a well-equipped port (Port Okha) 200 miles from the main block (map, p. 291).

In many cases state boundaries cut across important economic and communication lines, giving rise to disputes such as that between Bahawalpur and Bikaner over Sutlej irrigation priorities. The distribution of British territory was not accidental: it included practically all the coasts, except those of Baluchistan, Kathiawar and Travancore–Cochin; the entire Indo-Gangetic plain barring a few enclaves mostly on the Sutlej–Jumna doab; bridges linking Bombay, Madras, Calcutta and Delhi, and corridors separating large states such as Hyderabad and Mysore. The great majority of the states lay in a wide belt from Kathiawar across to Orissa—the old marchlands between the empires of Hindustan and the kingdoms of the more open Deccan plateaus. But no single state in this shatter-zone exceeded 36,250 square miles or 3,050,000 inhabitants.

The Partition gave Pakistan the Baluchistan and North-West Frontier Province states and tribal agencies, with the Punjab states of Bahawalpur and Khairpur; but these totalled only 128,000 square miles and 4,381,000 people and their separation did not simplify matters much. Hyderabad and Kashmir are still *sub judice*. The great bulk of the states adhered, some with reluctance, to India, and the first geographical task facing the Union was the tidying up of the archaic fragmentation of its territory. Of recent years a few tentative steps to coordination had been taken: the minor states were grouped to elect representatives to the Chamber of Princes; there was some organization of common judicial, police and technical services in the more fragmented areas; and in 1944 a number of statelets were more or less amalgamated with Baroda. But on the whole the map of India remained an anarchy. This was nowhere more com-

plete than in Kathiawar where, counting all enclaves and exclaves, an area of under 40,000 square miles was divided into 860 distinct territorial units. A sweeping programme of mediation has now been carried through, and within a year the number of units has been reduced from over 500 to some 25, states or unions of states joining the Indian Union as blocks.

The larger and more populous states, and some geographically isolated, are regarded as "viable" and remain untouched. Most of the rest have been, or will be, either amalgamated with contiguous provincial territory, grouped into sub-federations, or centrally administered. The process is not quite complete; and it should be noted that the old Provinces of British India will in future be known as States of the Union. The states completely merged or submerged are mainly the very petty Eastern and Chhattisgarh States, which have gone to Orissa and the Central Provinces (except Seraikela and Kharsawan, which have joined Bihar); and the Gujarat and Deccan States (excluding Kolhapur), to Bombay. The total is nearly 85,000 square miles and the total population over 12 millions.

The unions so far formed are Madhyabharat (Gwalior–Indore–Malwa), Matsya, Rajasthan, Patiala and East Punjab, Saurashtra and Vindhya Pradesh. Madhyabharat, with nearly 47,000 square miles and over 7 million people, is the largest of these. Gwalior with over 4 million, and probably also Indore with 1½ million, might have been regarded as viable states; but they are much intermingled with adjoining states and this has provided a good argument for federation. As it is, portions of Rajasthan and Madhyabharat still interlock. Bhopal stands apart, perhaps as the only important Muslim-ruled state in central India; moreover its area of 6921 square miles is, by exception, in a single compact block. Vindhya Pradesh comprises the rather backward states in the eastern part of the old Central India Agency. The larger Rajputana states (except Udaipur) stand on their own; the smaller ones have federated with Rajasthan and Matsya. Saurashtra unites no fewer than 449 units of which 30 were jurisdictional states, and gives the Kathiawar peninsula political unity save for Junagadh and the Baroda enclaves. In the East Punjab unity may be inspired by Sikhism; this would account for the accession of Patiala which, with nearly 2 million people, was originally regarded as viable. All these unions called for tact to overcome ancient rivalries of prestige and status, and jealousies over such matters as the selection of presidents and capitals; the success with which these difficulties have been surmounted is creditable to Indian diplomacy. The resurrection of archaic names for the unions was probably one factor in allaying local jealousies.

The areas to be centrally administered are Cutch, Junagadh, the Punjab Hill States and possibly Jaisalmer. Of these the first and the last border Western Pakistan, while the Punjab Hill States, now known collectively as Himachal Pradesh, were mostly very small and have some strategic importance, flanking routes into Kashmir and lying athwart routes into Tibet. The crisis caused by the adhesion of the Muslim ruler of Junagadh to Pakistan, despite lack of geographical contiguity and the presence of a large Hindu majority in the population, was met by the occupation of the state by Indian forces in a decidedly *opera-bouffe* affair. A plebiscite has resulted in an overwhelming decision for union with India and probably the state will eventually become part of Sairashtra.

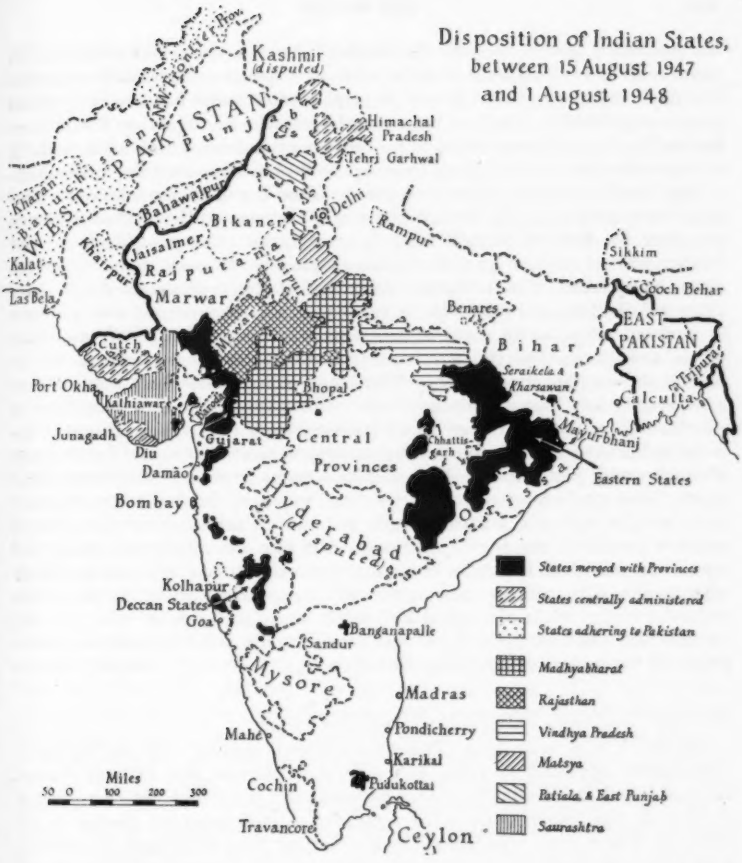
The map and table overleaf represent the position as far as it can be assessed on information available up to 1 August 1948. The table is based on the information contained in various issues of *India News* (published by the High Commissioner for India) checked where possible with the 1941 census; many of the figures can only be approximations, as there are considerable inconsistencies in

DISPOSITION OF INDIAN STATES ON 15 AUGUST 1947 TO 1 AUGUST 1948[1]

	No. of states	*Area (sq. miles)*	*Population (1941)*	*Chief states involved*
ADHERED TO PAKISTAN:				
Bahawalpur		17,494	1,341,209	
Baluchistan	3	79,546	356,204	Kalat, Kharan, Las Bela
Khairpur		5,989	305,787	
North-West Frontier and Tribal Agencies		24,986	2,378,000	Buner, Chitral, Dir, Swat
IN DISPUTE:				
Hyderabad		82,313	16,338,534	
Kashmir		82,258	4,021,616	
ADHERED TO INDIAN UNION:				
Merged with Provinces:				
To Bombay	?174	25,000*	4,317,000*	Aundh, Bhor, Jath, Sangli, Savantwadi (Deccan); Chota Udepur, Idar, Rajpipla, Sachin, Sant (Gujarat)
To Central Provinces	15	38,000*	4,064,000*	Bastar, Jashpur, Surguja
To Orissa	25	18,000*	3,025,000*	Gangpur, Kalahandi, Keonjhar, Patna
To Madras	2	1,444	482,940	Banganapalle, Pudukottai
To Punjab (East)	3	370	80,078	Dujana, Loharu, Pataudi
Formed into unions:				
Madhyabharat	22	47,000*	7,000,000*	Gwalior, Indore
Matsya	4	7,589	1,837,994	Alwar, Bharatpur, Dholpur, Karauli
Patiala and East Punjab	8	10,099	3,424,017	Faridkot, Jind, Kapurthala, Nabha, Patiala
Rajasthan	10	29,977	4,199,765	Banswara, Kotah, Tonk, Udaipur (Mewar)
Saurashtra	449	33,946	3,209,000*	Bhavnagar, Nawanagar, Porbander, Rajkot
Vindhya Pradesh	35	24,598	3,569,000*	Chhatarpur, Orchha, Panna, Rewah
Centrally administered:				
Cutch		8,461	500,800	
Himachal Pradesh (Punjab Hill states)	21	11,254	1,046,000*	Bashahr, Chamba, Mandi, Sirmur, Suket
Junagadh		3,337	670,719	
?Jaisalmer		15,980	93,246	

* Approximations only.

[1] Compiled from various issues of *India News* contained in Vols. 8 and 9, and from 'Census of India,' 1941, Vol. 1 (tables).



ADHERED TO INDIAN UNION: (*cont.*)

	Area (*sq. miles*)	*Pop.* (1941)
Outstanding, probably to be merged:		
Benares (U.P.) .	866	451,428
Cooch Behar (Bengal)	1,321	640,842
Khasi Hill States (Assam) . .	3,788	213,586
Rampur (U.P.) .	894	477,042
Sandur (Madras) .	158	15,814
Tripura (Bengal, adjoins Assam) .	4,049	513,010

(Probably some states will be merged which are here listed as "presumed viable")

	Area (*sq. miles*)	*Pop.* (1941)
Presumed "viable" by virtue of size or position:		
Baroda . .	8,176	2,855,010
Bhopal . .	6,921	785,322
Bikaner . .	23,181	1,292,938
Cochin . .	1,493	1,422,875
Jaipur . .	15,610	3,040,876
Jodhpur (Marwar)	36,120	2,555,904
Kolhapur . .	3,219	1,092,046
Manipur . .	8,620	512,069
Mayurbhanj .	4,034	990,977
Mysore . .	29,458	7,329,140
Sikkim . .	2,745	121,520
Tehri Garhwal .	4,516	397,369
Travancore . .	7,662	6,070,018

the published figures, even in the numbers of states in various groupings, let alone areas and populations. For the sake of completeness it may be added that Portugal retains 1,537, and France 203 square miles, with 624,000 and 323,000 people respectively. Goa has a more tangible value to Portugal than Pondicherry has to France, and there seems to be some metropolitan sentiment in both. It is ironic that the relics of these empires should have survived the British Raj.

The year's change is indeed impressive. That it will on the whole work for good cannot be gainsaid; though the writer confesses to have shed a tear or two over the fates of Varnoli Nani (area 1 square mile, population 96) and Nahara (annual revenue £7 2*s*. 6*d*.), picturesque anomalies which may no longer adorn his lectures. The mediatized rulers will of course retain their hereditary titles and dignities and substantial privy purses; those so inclined may continue to perform some useful cultural functions, such as patronage of traditional music and dance. For the rest, once the initial statistical confusion is left behind the simplification of the political map will certainly be a boon to geographers no less than to administrators. More important is the removal of indefensible administrative archaisms, accompanied by large measures of internal political and fiscal reform in the unions and larger states, and the abolition of innumerable petty customs lines and local restrictions on economic development. Great problems remain, two of them—those of Kashmir and Hyderabad—fraught with the gravest issues; and the combination in one political entity of provinces which are, in theory at any rate, essentially democratic and republican with others hardly emerging from absolutism will mean difficult adjustments. The princes have apparently co-operated gracefully and often enthusiastically; while the speed and smoothness with which this great reorganization has been carried out speak well for the drive and administrative ability of the leaders of the States Ministry. O. H. K. SPATE

IMAGO MUNDI, FOURTH VOLUME

The third volume of *Imago Mundi*, the journal dealing with the history of cartography, appeared in 1939, edited by Leo Bagrow and Edward Lynam and published in London by Henry Stevens, Son and Stiles. After a lapse of eight years the fourth volume has appeared in circumstances related in the editorial. The volume is published by the Kartografiska Sållskapet, Stockholm, with assistance from the Humanistiska Fonden. Dr. Lynam has been obliged by pressure of work to retire from the joint editorship, and the editor is assisted by three corresponding editors, Miss E. M. J. Campbell being the English. It is intended to publish all the papers in the English language, and doubtless when satisfactory arrangements have been established, the standard of translation and proof-reading will in future be improved. The utility of *Imago Mundi* as a channel of communication between students of historical cartography is apparent from the present number; a complete enumeration, for example, of the manuscript atlases of Baptista Agnese is being accumulated, and the existence of three states of the maps in the Bologna Ptolemy of 1477 is revealed. Longer articles include an analysis of the Mercator-Hondius atlases by J. Keuning, and a discussion by L. Bagrow of the material available to J. G. Sparwenfeld for the compilation of the map of Silesia which he is known to have undertaken for the younger Blaeu in 1689. The comprehensive bibliography of recent books and articles is continued, and the high standard of facsimiles is maintained. Messrs. Henry Stevens, Son and Stiles, to whom earlier volumes owed much, are the sole distributors for Great Britain and the United States. (Price: one guinea.)

G. R. C.

NEW TWO AND A HALF INCH MAP OF THE ORDNANCE SURVEY

Considerable progress is being made with the issue of the new Two and a Half Inch (1/25,000) series of the Ordnance Survey. This map is the result of a recommendation of the Departmental Committee of 1935, which has been well justified. The new map has been well received, but it is desirable that it should be as widely known as possible. Five hundred sheets of the provisional edition have already been published—about one-fifth of the total—and it is hoped to complete it within three years. "Provisional" signifies that the map is based upon the old 6-inch maps, with the incorporation of certain information collected for wartime purposes. The Final Edition will use the 50-inch resurvey of the built-up areas which is now proceeding, the revised 25-inch plans for the rural areas, and resurveyed contours. In addition to the fully coloured edition, there are also an outline edition and an administrative-areas edition.

The standard size of the sheets is $15\frac{3}{4}$ inches square, the sheet lines being the 10-kilometre grid lines of the National Grid. As the point has sometimes been raised, it may be noted here that the sheet lines are not true north–south and east–west. The difference between Grid North and True North is stated for the centre of each sheet. The sheets carry grid lines at intervals of 1 kilometre, with tenths indicated in the margins. Geographical coordinates are given for each corner only. Contours at 25 feet intervals are in brown. Trigonometrical stations and bench-marks (except in built-up areas) are shown, but not their heights which can be obtained from the Director-General. Water and marsh are in blue, road fillings and sand in brown. The sheets are known by the 10-kilometre grid references of their south-west corners, since the problem of finding an accurate title for each is probably insoluble.

Certain changes have been made in the style originally proposed for the coloured edition, which have improved the general effect of the map. The contours at 100 feet intervals have been further strengthened. Much of the detail on the black plate is now printed in grey (*e.g.* wood symbols, field boundaries); buildings are filled with grey instead of black hatching, though in built-up areas public buildings remain in solid black. These changes are particularly effective in the sheets covering the Greater London area, where the black plate would otherwise dominate the sheet. An additional symbol, a blue circle, is now used to denote the L.P.T.B. stations; these are not individually named and the connecting underground tracks are omitted, no doubt to avoid overcrowding.

The outline edition is in grey monochrome with all the details of the fully coloured edition except those in brown. This unfortunately results in the omission of the contours. The administrative areas edition has the boundaries of all units down to parishes and wards and their names overprinted in red on the outline edition.

The scale of 1/25,000 allows minor topographical features to be shown adequately, and these sheets will be found convenient for local studies. The series deserves to be widely known, and its completion without undue delay will be welcomed by all geographers. G. R. C.

THE NEW FRANCO-ITALIAN FRONTIER

After the publication of the note under this heading in the last number of the *Geographical Journal* (111 (1948) 143–6), it was announced in Paris and Rome that by a new Franco-Italian agreement dated 8 July 1948 France would return to Italy $6\frac{1}{2}$ square miles of territory gained by the peace treaty of 1947. The four areas now returned were considered to be of no value to France but their loss had caused great inconvenience to Italy. Five square miles are returned in

the Mt. Cenis area and in particular the Granscala hydro-electric power station, which was one of four hydro-electric power stations originally gained by France. That number is consequently reduced to three. During the winter of 1947–8 the French realized the inaccessibility of the power station across the watershed.

The other three retrocessions are very small. They are one-third of a square mile west of Clavières, to restore ski slopes to that Italian winter sports resort; two-thirds of a square mile at Oliveta east of Sospel, to provide the Italian villagers with vital pastures; and another one-third of a square mile nearby to give an Italian hydro-electric plant control of a reservoir.

In return for these four changes, Italy has agreed to build a dam on the lower Roya river which will increase the water supply for the French town of Mentone, and also to give facilities for freer movement across the frontier at Ventimiglia and other places.

R. J. HARRISON CHURCH

OBITUARY

DR. VAUGHAN CORNISH, D.SC.

Dr. Vaughan Cornish died at his home at Camberley on 2 May 1948, aged eighty-five. Born at Debenham, Suffolk, son of the Rev. C. J. Cornish, he was educated at St. Paul's School and Manchester University, where he graduated in 1888 with honours in chemistry, later taking a D.SC. degree. After a few years as Director of Technical Education to the Hampshire County Council, he retired in 1895 in order to give more of his time to travel and research. He made a special study of wave formation—sand and beach waves as well as waves in rivers and at sea—and it was for this pioneer work that he was awarded the Gill Memorial by the Society in 1900. His interests extended to many branches of geography; he had written and lectured extensively on historical and strategic geography, but he will probably be most widely remembered for his appreciation of natural scenery to which he gave much of his later life. Among his many works on the subject are 'The poetic impression of natural scenery' (1931) and 'The scenery of England' (1932). He presided over Section E of the British Association in 1923, and was President of the Geographical Association in 1928.

CORRESPONDENCE

THE NUBA

Though it is always invidious for authors to reply to their reviewers, this might be justified where the reviewer paid insufficient attention to the book on which he is reporting. This is the case in M. G.'s review of my book on 'The Nuba' in the last issue of the *Journal* (111 (1948) 124–5). To take his criticisms seriatim:

(1) The reviewer holds that in my analysis of clans and their segments these appear less complicated than they are likely to be if judged "in the light of our general knowledge of African social organization." Such a judgment, which is

not based on knowledge of the societies in question, seems somewhat unconvincing. However this may be, the reviewer's additional criticism that I have not clearly stated the relations of these social units to territorial groupings takes no account of the numerous maps, diagrams and lists (some even quoting population figures) showing the distribution of clans in the various local communities.

(2) I am also accused of calling "witchcraft" what is only "punitive magic." But where I speak of witchcraft I either base myself on the vernacular term—"stealing the soul" (p. 157), which corresponds to the widespread African conception of witchcraft, or I speak of an "avenging magic" amounting only to a "transition to witchcraft" (pp. 253–4). Indeed I add the qualifying remark that this conception of witchcraft is only as "explicit as witchcraft in the classical sense of the word is anywhere in the Nuba Mountains" (p. 254).

(3) My advice to Government is said to be "cast in too vague terms to be impressive," and thus to contradict my claims to have contributed to "applied anthropology." But on p. 496 I explain the dangers of accepting a priest-king as a Government Chief; I voice the warning that hereditary chieftainship is not the panacea that Governments often think it to be; equally, I analyse the consequences of premature tribal federations (pp. 492–3); I emphasize the importance of clan rather than territorial representation on Native Councils; and on pp. 512–3 I suggest a definite scheme for "moral education" based neither on official support for Islam nor on missionizing (for which missionaries have already attacked me). If advice of this kind is not sufficiently "impressive," I would claim that the task of applied anthropology lies not in presenting Government with definite programmes of policy, but rather in demonstrating the conditions in which this policy would be applied and the consequences which alternative policies are likely to have. Whether or not this view has its usefulness is best judged by the Government concerned; and here I need only refer to the Preface to my book written by the late Governor-General of the Sudan.

(4) A final criticism however I must accept. It is true that I have nowhere stated clearly "whether or where I worked in the vernacular." But I thought that this would emerge from my statement that I worked for a long period (one year) only in three adjacent tribes, two of which speak an almost identical language—which I learned. I refer in my Nuba book to my previous book on the Nupe in Nigeria where I have fully explained my technique of field work: this includes the use of the vernacular whenever this is possible. That this was impossible in the other Nuba tribes, among which, as I specially stated, I only spent an average of two months, should be self-evident. S. F. NADEL

19 *July* 1948

THE RELATION OF GEOMORPHOLOGY TO GEOGRAPHY

Arising from the letters of Mr. W. L. Seaborne in the *Journal* (110 (1947) 261) and the reply of Mr. D. E. Sewell (111 (1948) 148), some defence of geomorphology as an aid to more sound, scientific thinking and terminology in geography seems necessary in face of the biased opinion of the latter.

Geography has been long enough derided as unscientific and vague. We must use terms in one sense and in a scientific sense which will bear investigation. Unless therefore we resort to a purely descriptive geography we must use scientific terms for our terminology of landforms and the genetic concept of geomorphology is for this purpose most sound and will bear the closest scrutiny by our colleagues in other sciences.

Furthermore geomorphology is not to be left to the science of geology, for it is a genetic study of the *surface* features of the earth and is as much concerned with erosion and the present stage reached in their evolution as with their geological structure; and, as the geographer is primarily interested in man and in the environment in which man lives, so the scientific study of the earth, geomorphology, must find a place with the geographer who is aware of the modern conception of his subject. In any study of environment the study of the type of existing landforms must be given a place with the study of climate or any other component of environment.

The plea of Mr. D. E. Sewell for the study of "the most important fields of the subject—the regional and economic ones" ignores the fact that studies in the economic and social geography of a region must be closely correlated with a study of environment, and that even the pioneer schools of the Social and Regional concept in France by no means neglected the thorough study of the physical geography of the region. We must never again plunge geography into the abyss of vagueness which would be the inevitable result of shrinking from the use of scientific thought and exact terminology, especially with reference to landforms.

To turn to the use of specific terms, Mr. Seaborne is more than justified in asking for a better understanding and more correct use of such terms as scarp, escarpment, and cuesta. Considerable confusion might be avoided among our younger geographers if it were realized by their seniors that a ridge possessing a steep "scarp" slope and a gentle "dip" slope is only an "escarpment" within the geologists' meaning when the trend of the scarp is in the same direction as the geological strike of the beds and the dip slope exactly follows the dip of the beds. Thus the Berkshire Downs, although having a steep north facing slope or "scarp" slope and a gentle south-easterly facing dip-slope, are not a true escarpment in the geological sense as the trend of the scarp does not quite coincide with the strike of the beds, as does the scarp and strike of the Chilterns, a true escarpment. Nevertheless the Berkshire Downs are certainly a cuesta, within the meaning of the term as used by geomorphologists and geographers of repute alike, and as most consistently used by W. M. Davis; that is, an assymetrical ridge due to the erosion of a series of dipping strata of unequal resistance, giving rise to a steep scarp slope and a gentle dip slope. The use of the term "scarp" for any other steep slope than those of a true escarpment, or of a cuesta, would be best abandoned.

Geomorphology has a great future and a great part to play in aiding a scientific outlook and scientific exactness in geographical thought and terminology, and the traditional link of geomorphology and geography must not be allowed to die in this country unless geography is to become a vague, unscientific, "humanistic" study with a strong political and economic flavouring. R. JESSOP

22 *July* 1948

TIBET AND CIVIL AVIATION

In the light of the Royal Indian Air Force's present operations in Kashmir, Mr. R. R. Rawson's observations in the *Journal* (110 (1947) 261) are both interesting and topical. Since he wrote, history has been made by the pilots of the same Dakota type of aircraft he mentions in his letter. Transporting reinforcements and supplies to Leh in the Ladakh district of Kashmir they landed on an airfield 11,187 feet above sea-level, probably the highest in the world. In so doing they flew without the aid of oxygen at a height of 19,000 feet.

Darjeeling, 9 *June* 1948 M. K. PROSSOR

BIOLOGICAL FACTORS IN THE BREAKDOWN OF CORAL REEFS

The contribution of Rhodes W. Fairbridge and Curt Teichert on changes in the physiography of the Low Isles over the period 1928–45 ("The Low Isles of the Great Barrier Reef: a new analysis," *Geogr. J.* 111 (1948) 67–88) is of particular interest. It is the most detailed chapter available in the biography of any coral reef. The authors are well aware that the state of a reef at any particular time represents the integration of a variety of factors, both physical and biological. I suggest however that they perhaps insufficiently appreciate the possibilities of coral breakdown, and solution of coral limestones, brought about by living organisms. Their apparent neglect of this factor in no way invalidates their thesis or conclusions; but for full understanding of the possibilities, "breakdown and solution by living organisms" should be included among the other retrograde processes which are listed (pp. 86–7), namely (i) tides and currents, (ii) increased sedimentation, (iii) acid action in the swamp, and (iv) chemical solution by sea-water. No doubt the relative importance of these processes varies in different parts of the world. At least in the northern part of the Red Sea, the history of a reef is greatly influenced by the breakdown of coral by living organisms, a subject which I had the pleasure of studying some years ago at Ghardaqa (*Proc. Zoo. Soc. London*, 1936, pt. 4, pp. 1011–26).

20 *July* 1948 G. C. L. BERTRAM

A CURE FOR MOUNTAIN SICKNESS

In Colonel Bailey's note on "Food for an Everest expedition" (*Geogr. J.* 111 (1948) 149), he mentions mountain sickness. The Hunza people claim that chewing the local dried apricot is a preventive of mountain headaches and sickness, and I certainly found it so for the comparatively low heights (up to 17,500 feet) on which I tried it. G. DALYELL OF THE BINNS

25 *July* 1948

ICE CLEARANCE IN OSLO HARBOUR

Some wrong statements seem to be favoured with immortality. This is specially remarkable in handbooks, dictionaries, encyclopaedias, etc., where one author quotes another, for generations. In the newest and best books of this kind, *Encyclopaedia Britannica*, 14th edition, and the American *Columbia Encyclopedia*, we read about Oslo: "The harbour is ice-bound for three or four months in the winter." As a matter of fact, the harbour of Oslo has been kept open and ice-free during the whole winter every year since 1877. But in the geographical dictionaries, encyclopaedias, etc., the harbour is still frozen-up every winter.

During the last seventy years several attempts have been made to correct this mis-statement, but in vain. I have little hope that it will have any better effect this time, but I consider it a part of my duty to try to eradicate such meaningless errors. W. WERENSKIOLD

Oslo, 1 *July* 1948

[The London Editor of *Encyclopaedia Britannica* informs us that this statement has been corrected in the latest printing of the *Encyclopaedia*.—ED. *G.J.*]

MEETINGS: SESSION 1947–48

Fifteenth Meeting, 5 April 1948. The President in the Chair

Elections to Fellowship: Sayyid Maqbul Ahmad, B.LITT.; Ernest Ashby; Derek Barrington; Stephen Arthur Bucknall, M.A.; Captain Richard Francis Coombs, B.SC.; The Rev. Brian Lees Gandon, J.P.; Mrs. Viola Noel Isabel Gover, M.A.; Owen Griffith; Leslie Holmes; Commander Logan Hook, R.N.; V. Krishnamurty, M.A.; Roger James Marriott; Mrs. Bridget Moss; Ernest Tom Neathercoat, C.B.E., D.L., J.P.; L. A. Pittam, B.A.; Miss Joan Prewett; A. H. J. Prins, M.A.; Professor Robert Strausz-Hupé, M.A., M.SC., PH.D.; The Rt. Hon. Viscount Trafalgar; Harry Watson, A.R.I.B.A.

Elections to Associate Membership: Geoffrey Stuart Bowden; Miss Lorna Ogilvie Scott

Paper: The Russian land and history. By Mr. John Lawrence

Sixteenth Meeting, 12 April 1948. Dr. N. E. Odell in the Chair

Film: Aerial mountaineering. Technicolour film with commentary by Colonel Walter A. Wood

Seventeenth Meeting, 26 April 1948. Mr. J. N. L. Baker in the Chair

Paper: English surveyors and mapmakers, 1555–1611. By Dr. Edward Lynam

Eighteenth Meeting, 3 May 1948. Mr. G. Seligman in the Chair

Paper: The present climatic fluctuation. By Professor Hans W:son Ahlmann

Nineteenth Meeting, 10 May 1948. The President in the Chair

Elections to Fellowship: George Anthony Atkinson; Reginald Jeffrey Bluett, M.A.; R. F. Bristowe; Miss Ailsa Mary Brownrigg; Flight Lieutenant Hubert Joseph Cardeaux, R.A.F.; Flight Lieutenant J. Vivian Chitty, R.A.F.; Squadron Leader Derek Clare, D.F.C., R.A.F.; Major John Ernest Clowes; Lieut.-Commander Kenneth Craddock-Hartopp, R.N.; Edward Newton Fennell; Brian Gamble; Frederick James Glover; Malby Edward George Goodman; Ian Hall Grant; James Laurie Hair; Sir William Halcrow; Stanley William Charles Holland; Major William Hughes; Desmond Lionel Howard-Ady; John Hervey Keating, M.A.; Richard Bradford McConnell, D.PHIL., B.SC., F.G.S., A.I.M.M.; Rodney Milligan; Captain Alan Douglas Mansfield, R.A.; Donald Moores; Adekanbi Mumuney; Samuel Ayodele Olukoya; Thomas Bernard Alan Rice; Irving Rogers; Jerrold Maurice Salomon; Harry Alec Stanley Sanders; A. T. Sharaf, M.A.; William R. Sitwell, M.A.; Frederick Ernest Smith; Gerald William Sparrow; Sir James Stephen, Bart.; Ronald Ivor Swell; Miss Cynthia E. Wickers, B.A.; Major T. G. Wilkinson; Edward Hoole Wraith; Thomas William Skuse

Elections to Associate Membership: Miss Pamela Southwell FitzGerald; Rhoderick Malcolm Powrie; John Desmond Gordon Smart

Paper: Geography and war strategy. By Professor Cyril Falls

Twentieth Meeting, 24 May 1948. The President in the Chair

Paper: The boundaries of local government areas. By Mr. E. W. Gilbert

Twenty-first Meeting, 31 May 1948

Film: Photo-Canada. Kodachrome film with sound commentary

Twenty-second Meeting, 7 June 1948. The President in the Chair

Elections to Fellowship: Miss Marion Grace Constance Alner, B.A.; Samuel John Astbury, M.A.; Donald Reynell Barr Wells; Peter H. Barratt; Miss Doris Frances Berkley; Arnold Jonès Berrey, B.A., A.K.C.; Captain G. J. Bonwick; Major Ivor Buxton, D.S.O.; Niall Strachur Campbell; Arnold Chappell, B.A.; Harry Burford Cooke; Bimal Chandra Datta; Jesse Davis Dean, M.A.; Richard Guy Dexter-Napier-Martin, M.A.; Flight Lieutenant Richard Bertram Gilman; Frank Hamer; Rev. Walter Stuart Harris; David Hughes, B.A.; Thomas Moore Knight, B.A.; J. O. Laniyonu; E. C. Lanning; Arthur Marshman; William A. Mercer; Miss Eileen M. Norton; John Elsden Odle; Miss Mary Francesca Oxley, B.A.; Major J. M. Patrick, B.SC.; Ezra Edmund Plummer, B.SC., F.G.S.; Brigadier Alexander Prain; Gordon Denis Ramsay; George Read; Alan Leatherbarrow Reid; H. Robinson; James William Scott; Clifford Thorpe Smith; John Francis George Smith; Lewis E. Stevens; D. W. Tyler; James Whittaker; The Rev. Leonard Alfred Wide; William Denison Clare Wiggins

Elections to Associate Membership: Anthony Paul Atkinson; Charles W. Carson, Jnr.; Alan John Hume; Arthur William Moffatt; Henry Lynne Plummer; Edward Trevor Stringer; Albert John Frederick West; Cyril Baxter Williamson

Paper: Explorations in the Canadian Arctic. By Dr. T. Paterson

Annual General Meeting, 14 June 1948 (see report below)

Twenty-third Meeting, 21 June 1948. The President in the Chair

Paper: The geographical relation of the U.S.A. to world policies. By Dr. Isaiah Bowman

ANNUAL GENERAL MEETING, 14 June 1948. The PRESIDENT, The Right Hon. The Lord Rennell of Rodd, in the Chair.

The HON. SECRETARY, Mr. Leonard Brooks, read the Minutes of the Annual General Meeting held on 16 June 1947, which were confirmed and signed by the President.

The PRESIDENT then said: My first duty this afternoon is the one I always find most pleasant. It is to present to the distinguished geographers and travellers the Royal Medals and Awards of the Society. The Royal Mint last year recommenced striking the Gold Medals which we were able to present for that year. Since then the Mint has been able to catch up with arrears and has delivered to the Society all the Gold Medals awarded since 1939. A few of the recipients have already received their Medals during the Session which is coming to a close. We are particularly fortunate in being able to present personally two more of those in arrear this afternoon, to Mr. and Mrs. Harold Ingrams, and to Dr. Camsell who has come from Canada to be with us to-day. I will however first present the medals and awards for the current year.

With the approval of His Majesty the King, the Founder's Medal for 1948 has been awarded to Mr. Wilfred Thesiger "for his contributions to the geography of Southern Arabia and for his crossings of the South Arabian desert, the Rub' al Khali." Mr. Thesiger's record as a determined, observant and original traveller in Arabia is already well known. But before that he had already travelled in the Danakil region of Ethiopia in 1933, when he was able to settle the question of the true source of the Awash river. Five years later he made a long camel journey of some two thousand miles into the Ennedi–Tibesti mountains of the Sahara. After distinguished service during the war in Ethiopia, the Western Desert and Arabia, for which he was made a Companion of the

D.S.O., he made a notable journey in 1945–46 in the previously unexplored southern fringes of the Rub' al Khali, east of the Hadhramaut, and in Tihama in the Red Sea region. On these journeys, in addition to survey, he investigated the breeding of locusts, the seasonal rainfall and vegetation, and the tribal organization of the inhabitants. From this experience he was prompted to attempt the crossing of the Rub' al Khali, which he successfully accomplished this year from the Hadhramaut to Suleil in the north by a new route. It is for these arduous journeys, and the geographical knowledge which has resulted from them, that he receives the Founder's Medal this afternoon.

Mr. WILFRED THESIGER: Mr. President, Ladies and Gentlemen, I am very honoured to have received a gold medal from the Society in recognition of my journey in Southern Arabia, and I am specially proud when I think this award was granted to such great Arabian travellers as Doughty, Burton and Philby. I have also to thank this Society for the unceasing encouragement and help which it has always given to me. It is interesting I think that all the important journeys in Southern Arabia have been made by members of this Society.

Arabia has changed enormously of late, but I am glad that my journeys have been carried out by camel in the old traditional ways among the unspoilt wastes of the Empty Quarter and the Hedjaz Mountains. Nowadays an aerial survey will cover in a few hours country that it would take months to cross on foot. But those who carry out such a survey need have no knowledge of the country, and though they are spared the difficulties and discomforts of desert travel, they will never know the gripping fascination of Arabia. I have lived and travelled with the Southern Bedu. They accepted me amongst them despite my religion, broken Arabic and other, to them, obvious shortcomings. They took me wherever I wanted to go and some of the places were very out of the way. You have given me a gold medal for these journeys, but it was they who taught me the little I know of desert travel and without them I should not have gone ten miles.

The PRESIDENT: His Majesty The King has also approved the award of the Patron's Medal for 1948 to Mr. T. H. Manning. Mr. Manning has a long record of travel and scientific work in the Canadian Arctic. As a member of the Canadian Geodetic Survey, he surveyed Southampton Island where he made geological and ornithological collections. In 1936 he organized and led the British Canadian Arctic Expedition, which in three seasons added much to our knowledge of Southampton Island, Melville Peninsula and Baffin Island. Since then he has continued his survey work for the Canadian Government, mainly in mapping the Hudson Bay region. In his journeys Mr. Manning has successfully adapted Eskimo methods of travel with results of great value to all arctic explorers. As Mr. Manning is at present in Canada, I will later ask Dr. Camsell to receive the Medal on his behalf, as well as his own Medal.

The Council have awarded the Victoria Medal for 1948 to Professor Frank Debenham. Professor Debenham is well known as an authority on the Antarctic and as first Professor of Geography at Cambridge University. He was surveyor and geologist on Scott's last expedition; he is a link between the revival of British work in the Antarctic and the explorers of to-day. He has made valuable contributions to the study of the polar regions, both as the first Director of the Scott Polar Research Institute, with the foundation of which he was closely associated, and by his encouragement and assistance to recent expeditions. His published work includes much on the physiography and glaciology of the Antarctic, on survey and cartography, and on all aspects of polar exploration. His more recent geographical work has taken him to Africa.

Professor F. DEBENHAM: Mr. President, I would like to thank you and the

Council of the Society very much indeed for this great honour; and you in particular, sir, for what you have said about me. It is indeed an honour to join a distinguished company of medallists such as the former recipients of this Victoria Medal. I shall only mention one of them, Dr. Hugh Robert Mill, because I have joined this company largely as a result of the inspiration I have derived from his writings and his friendship. I first fell under his spell when as a schoolboy in Australia fifty years ago I read his 'Realm of nature.' It was that book which drew me away from geology to physical geography. Later, when I came to England and met the man himself, I came still further under his influence, being associated with him both on the Council of this Society and in matters concerning antarctic exploration. Needless to say his spell endured, and most of those listening to me know what I mean by Dr. Mill's inspiration.

You, sir, have handed me this Medal for the work you mentioned, namely, in geographical education and the establishment of the Polar Research Institute. I want to say—and inevitably I am repeating what Mr. Thesiger has said—that any man who receives a medal must be one who is representing a team—and it is doubly so in my case. Both in my geographical career and in my Polar Research Institute work, I have always been helped by a team. I have always had a clever, a willing and pleasant staff, and I cannot help feeling that I should share this medal with them because they have done a great deal towards earning it.

The PRESIDENT: The Murchison Grant is awarded to Mr. R. W. Steel, Lecturer in Colonial Geography at Oxford University. Mr. Steel has made a particular study of the geographical aspects of the social sciences to which this Society attaches much importance. He and his associates have described to us the results of work on these lines carried out in Ashanti. The need for such studies in the colonial territories, as well as at home, is now widely recognized, and we hope that this award will be an encouragement to Mr. Steel to continue research in this important aspect of geography.

Mr. ROBERT W. STEEL: I am deeply honoured by this recognition of my geographical work in West Africa. It is a recognition that was unexpected and is, I fear, largely undeserved. I regard it as a tribute not to my own work—I have no illusions about that—but to the activities of the Ashanti Social Survey team of which, with Dr. Meyer Fortes and Miss Ady, I was a member in 1945–46. I look on it too as a recognition by the Society of its belief in the participation by geographers in team research, particularly in research which involves collaboration with our colleagues in the social sciences. This award will be a great encouragement to those geographers in this country who are working in the colonial field. As you know, there are not many of us at the moment. I look forward to the day when there will be many more, and I am sure we shall be spurred on to greater efforts as we realize that we have the backing of the Royal Geographical Society.

The PRESIDENT: Mr. A. J. Marshall, to whom the Back Grant has been awarded, is Demonstrator in the Department of Zoology and Comparative Anatomy at Oxford. He has pursued his researches in the field as a member of the 1934 Oxford University Expedition to Espiritu Santo in the New Hebrides, and two years later, on an independent expedition to northern New Guinea. Last year he was leader of the Oxford University Exploration Club Expedition to Jan Mayen Island, the first post-war British expedition to the Arctic.

Mr. A. J. MARSHALL: Mr. President, I thank you very much for this honour. It is customary to say that such a thing is unexpected. I feel that probably it almost always is! I suppose that an award such as this can be likened, vaguely, to a service award. In the army with which I served—the A.I.F.—junior

officers who earned a V.C. but who stayed alive were usually given a D.S.O. The Battalion commander, after a satisfactory action, generally got a D.S.O. anyway. I cannot help feeling that the award of the Back Grant to me must be regarded as a "Battalion" award due really to members of my party—though I personally have had the great good fortune to receive it.

The PRESIDENT: Dr. Donald F. Thomson, who receives the Cuthbert Peek Grant, is distinguished for his contributions to our knowledge of Arnhem Land, Northern Australia. On behalf of the Australian Government he carried out alone in 1935–37 a thorough anthropological investigation of its little-known peoples, securing some remarkable films and adding much to the map of that largely unexplored territory, besides making zoological collections. His anthropological work was recognized by the award of the Wellcome Medal in 1938. During the war Dr. Thomson served with the Australian Army in Arnhem Land, where his knowledge was of great value. Dr. Thomson is in Australia, but the High Commissioner, the Rt. Hon. J. A. Beasley, is here to receive the award on his behalf.

THE HIGH COMMISSIONER FOR AUSTRALIA (The Rt. Hon. J. A. Beasley) said he was happy to receive the Grant on behalf of Dr. Thompson, and went on to speak of the political importance of Dr. Thompson's work in exploring a little-known part of Australia's northern territories.

The PRESIDENT: The Gill Memorial is awarded to Mr. W. W. Williams for his research during the war on the determination of underwater beach gradients. Mr. Williams has had many years' experience of topographical survey in Ceylon, and is now in the University of Cambridge. In preparation for the landings in Europe, he investigated the gradients of beaches through the interpretation of air photographs of the effects of wave action. Though evolved for a military purpose, his methods are applicable to the wider problem of beach formations.

Mr. W. W. WILLIAMS: I wish to express my gratitude to you, Mr. President, and your Council for the honour they have done me in making this award. As a soldier and a land surveyor I was presumptuous enough during the war to cross the line and take to the water. I was not rebuffed by the hydrographers of the Royal Navy, rather was I made welcome by them and with two or three of them we formed a happy team of workers whom I certainly number among my very good friends. I too feel that I am taking this award on behalf of others, and I should like to remember particularly two or three officers in the Army and two sections of Royal Engineers who over several years helped me with what, in the end, became a very humdrum piece of work. Again I should like to thank you, Mr. President.

The PRESIDENT: We now come to the Gold Medals awarded in earlier years. The Founder's Medal was awarded in 1940 to Mr. and Mrs. Harold Ingrams jointly, for explorations in the Hadhramaut and for their notable work in the peaceful development of that region. They have described their experiences in several papers published in the *Geographical Journal*, the most recent summarizing war-time developments in that fascinating region of Arabia.

Mr. HAROLD INGRAMS: It is a very great pleasure to express on behalf of both of us our grateful thanks for this award. We also would like to say how much the help and encouragement we have received from the Royal Geographical Society has meant to us and how much pleasure and happiness we have had in our contacts with it during our leaves in England. The news of the honour came to us as a very great surprise in the Hadhramaut eight years ago, and it was an especial pleasure to know that it was a joint award. I have always held that jobs in the Colonial Service should be joint jobs in a rather special way, and it made us very happy that the award recognized that we had done the

job together even if we wondered how we had deserved it. It also made us very proud that we were the first couple in the long history of this Society to be honoured with a joint award, though I hope we shall not remain for long the only couple. We also felt that it was an honour to the Service in which we still do a joint job.

The Hadhramaut remains, and will always remain, a country to which we are very devoted. It is a great pleasure that it still attracts visitors. Indeed, there must be something in the air of the Hadhramaut which conduces to the winning of medals because since we were awarded ours three others have been awarded in connection with the Hadhramaut, to our old friends Miss Freya Stark, now Mrs. Perowne, and Colonel Daniel van der Meulen, and now we can claim a share in even Mr. Thesiger's award. Both of us feel that much of the credit that we have had for the work done in the Hadhramaut really belongs to other people, and not only to Englishmen but particularly to a very old friend of ours, Seiyid Abubakar bin Sheikh Al Kaf who received a C.B.E., the first honour that was ever given in the Hadhramaut. I feel sure that such awards will encourage others to visit that strange and fascinating country in which we spent the greater part of ten very happy years, and to understand and, I hope, serve its people.

The PRESIDENT: In 1945 the Founder's Medal was awarded to Dr. Charles Camsell, then Minister of Mines and Resources in the Dominion of Canada. Dr. Camsell has made many contributions to the exploration and the economic development of the Canadian North. This medal is in recognition also of his work, as President of the Canadian Geographical Society, in the advancement of geographical knowledge in Canada.

In the same year another Canadian, Inspector Henry Larsen, Royal Canadian Mounted Police, was awarded the Patron's Medal for his remarkable achievement of the North West Passage in the *St. Roch* from west to east in 1940–42, and from east to west in one season in 1944. Inspector Larsen has recently given us in the *Geographical Journal* a very interesting account of his voyages. I will ask Dr. Camsell to be kind enough to receive this Gold Medal on his behalf.

Dr. CHARLES CAMSELL: Mr. President, I have come a long way to this meeting and, as I remarked to you before we came into this Hall, it is worth it—especially when I carry this amount of gold back to Canada! The award of the Founder's Medal of the Royal Geographical Society is one of the most important honours that can come to any man in the field of geography. Certainly I appreciate it as one of the greatest honours that has come to me in the course of a fairly long and active life. If I did not think so I am sure I would not have been able to persuade my wife to embark on the great adventure of flying the Atlantic with me in order to be present on this occasion. I am also very sensible of the honour when I consider the list of illustrious names of men who have preceded me in being awarded the Founder's Medal of this Society. Their names are names to conjure with. I can recall with what considerable awe and admiration I, as a young man, viewed the accomplishments of these men.

Having come from such a distance, Mr. President, I would like to add a word or two in regard to conditions in Canada. As one comes to such a culminating point as this in one's career one cannot help looking back over things as they were in the past and comparing them with things to-day. If you will kindly bear with me for a moment or two I would like to refer to certain changes that appeal to a geographer.

The changes I speak of as applied to Northern Canada are due entirely to two factors: the introduction of the aeroplane for mapping and transportation,

and the use of radio for communication. No other two factors have so vitally affected the life of the people of Northern Canada, and the work of the explorer in that field. I have still vivid recollections of coming out of that north country when a boy to go to school in Winnipeg, a journey which took three months to make at that time and now can be made in a few hours. Mail came to us only twice a year at the little trading post where I then lived on the Mackenzie river; supplies came in once a year, in September. A summer mail came in September by York boat and a winter mail came by dog-team in March or April. The winter mail wound up at the arctic post of Fort Macpherson about the beginning of May, and it was, I imagine, a much more remarkable feat of transport than the pony express which ran from St. Louis to San Francisco in the days of the Californian gold rush.

Older Fellows of the Society may remember that thirty-two years ago I had the honour to present an article to the *Journal* of the Royal Geographical Society on the unexplored areas of Canada. At that time something like 30 per cent. of the Dominion of Canada was unknown, without counting the islands of the Arctic. To-day we have photographed at least 90 per cent. of the Dominion of Canada by aerial photography, a great part by vertical photography but a greater part by oblique photography. The equipment Canada has for aerial photography is sufficient to permit us to re-photograph the whole of the Dominion once every ten years. These methods have entirely superseded the old land method of surveying. Unfortunately they have taken all the romance out of exploratory work. In one of his verses Robert Service says, "In a land where the mountains are nameless and the rivers all run God knows where." Well, there are thousands of mountains still nameless in Canada but there are no rivers of which it can be said that we do not know where they run.

There is one other subject to which I would like to refer and which you, Mr. President, have mentioned in your introduction of me: that is, the Canadian Geographical Society from which I bring greetings to this Society. The Canadian Geographical Society was founded about twenty years ago, so that as a geographical society it is quite a young organization. The Society was sponsored by the Royal Geographical Society when we invited your then President, Sir Francis Younghusband, to cross the Atlantic and be present at our opening ceremony; we were also sponsored to some extent by the American Geographical Society. The Canadian Geographical Society might be called a child of the Royal Geographical Society. The work of our two organizations is however somewhat different. The object of the Canadian Geographical Society is perhaps more restricted than that of the Royal Geographical Society and we have a definite reason for that. Canada is a very big country and people in one part know little or nothing about the rest of it. Our population too is made up of a great diversity of races. The purpose of the Canadian Geographical Society is to make Canada better known to Canadians, so that we may ultimately develop a more homogeneous population in Canada. Perhaps however the most outstanding contribution of the Canadian Geographical Society has been in the field of education, by the production of a series of booklets covering the geographical aspects of the various provinces of Canada. These booklets have been approved by the Provincial Governments and the Departments of Education of the respective governments, and the movement has had very enthusiastic support. We are by this means endeavouring to spread a knowledge of Canada among the young people of Canada as well as the older folk who read the *Journal*. Films have also been produced. I am very glad, Mr. President, to report to you that the Canadian Geographical Society is now on a sound financial footing, in spite of the difficulties and trials of earlier days.

And now I want to thank you again for the honour that you have done me in presenting to me the Founder's Medal of the Royal Geographical Society which I take as an honour to Canada as well as to myself.

Next may I say a word about Inspector Larsen, on whose behalf I am receiving a medal. Some time in March I asked the Commissioner of the Royal Canadian Mounted Police if I could do anything for Inspector Larsen during my visit to London. Commissioner Wood sent a radio message to Inspector Larsen and he came down by aeroplane to spend a week-end in Ottawa. His ship was in the ice of the Beaufort Sea and he was waiting for the opening up of navigation some time in July so that he might continue his patrols. I could not help thinking of the men who first tried to make the North West Passage one hundred years ago. They could not come out to spend a week-end in Ottawa or anywhere else but had to remain where they were. That again is one illustration of the changes which have been brought about by the radio and the aeroplane. Inspector Larsen asked me if I would be good enough to accept the medal on his behalf and I am glad to do so. Larsen, who is a naturalized Canadian citizen of Norwegian birth, has been in the Mounted Police for twenty-five years, for sixteen of which he has been engaged in patrolling the arctic regions, visiting trading and police posts and maintaining the sovereignty of the Canadian Arctic on behalf of Canada. It is interesting that the only other man before him who made the North West Passage, Captain Amundsen, was also a Norwegian—and moreover came from almost the same locality south of Oslo. So, on behalf of Inspector Larsen, I am very glad and indeed proud to accept this medal.

As for Tom Manning, he is still as active as ever in Canada. He has recently organized a club which meets every fortnight, an association of men who have worked in the Arctic and who call themselves the Arctic Circle. Manning is responsible for the organization of that group, and a very active group it is.

The PRESIDENT thanked Dr. Camsell and then delivered the Presidential Address, which is printed on pp. 153–7.

Visitors then withdrew and the PRESIDENT appointed Miss E. M. J. Campbell and Lieut.-Colonel I. F. G. Hall to act as scrutineers of the ballot for the Council and Officers for the ensuing year.

The PRESIDENT: Before presenting the Annual Report of the Council for the year 1947, I would like to draw your attention to certain legacies and gifts which have been made to the Society during the past year. Early in the year we received a legacy of £100 from the late Mrs. Charlotte Cameron, who was elected into the Fellowship of the Society in 1913, to be devoted to repairs and reconstruction of our House made necessary by war damage. We have also received a legacy of £100 from the late Mr. Carder-Davies, a Life Fellow of the Society elected in 1936, to be used for the general purposes of the Society. We have to thank Mrs. Will Gordon for a biennial donation to provide about £30 for a lecture or paper on East African life, exploration, research or development, including Abyssinia and Somaliland, preference being given to a lecturer of British, American or French nationality.

I need hardly say that at the present time, when the financial situation of the Society is always a cause for anxiety, such gifts both for the benefit of scientific research and exploration and for the maintenance and development of the Society's House and amenities are most welcome.

The PRESIDENT then presented the Annual Report.

In reply to a question, the PRESIDENT said that whether or not the Life composition fees should be returned to revenue at the death of the member depended upon how long he had enjoyed the benefit during his lifetime and upon the

expectation of years of the surviving Life Members. He added that fewer Fellows had compounded since the compounding fee had been raised.

Replying to Dr. L. J. SPENCER, the PRESIDENT said the Council had decided at their last meeting that the Society's House should be closed at midday on Saturdays because the number of Fellows using the building on Saturday afternoons was too small to justify detaining the staff and the expenditure on lighting and heating. Dr. SPENCER said he thought the decision was hard on those Fellows who did use the House, and that he did not think the notice in the hall and that in the *Journal* gave adequate warning. The PRESIDENT sympathized and said that if a sufficient number of Fellows expressed a wish that the decision should be reversed, the Council would no doubt consider it.

The Annual Report was adopted.

The scrutineers informed the President that the list of candidates proposed as Council and Officers for the ensuing year had been elected (see list, volume preliminary, following title page).

The PRESIDENT: The new Council will take office on October 1. I welcome Professor Sir Henry Clay, Warden of Nuffield College, as a member. Also Air Marshal Sir Alec Coryton, Director of Aircraft Supplies, Ministry of Supply, who will be a welcome addition from the Services. Colonel Peter Fleming is one of our younger travellers; his journey into Central Asia is already well known to you. I would like particularly to refer to the election of Major-General W. G. Stevens who was in charge of the administration of the Second New Zealand Expeditionary Force of which he became General Officer Commanding in 1945. He is now Official Secretary to the High Commissioner for New Zealand in this country and will also be a most welcome addition to our Council.

Of the future activities of the Society it will be for my successor as President to speak, and I will only say that I think he will have a more difficult time than I have had because the future, I fear, is going to be financially and materially more difficult. But I know he will have the full support of all Fellows and of the staff of the Society, both of which he will need very fully. He will on the other hand bring a much vaster administrative and technical experience to bear than I have possessed. With me, I ask you to wish Sir Harry Lindsay very well and to thank him for having accepted the Presidency.

Sir HARRY LINDSAY: You will all wish me, I am sure, to give you an opportunity of showing that you realize what a great debt we owe to the retiring President. I am grateful to you for the honour you have done me in electing me to succeed Lord Rennell. This is not the time for me to make any rash promises. I will only say that I will do my best. I thank you all very much.

The Rt. Hon. Sir GEORGE CLERK warmly seconded the vote of appreciation to Lord Rennell for his term in the Presidency, and spoke of the ability and constructive energy he had given to the Society during three difficult years.

The PRESIDENT: I am very much touched by what my old friend Sir George Clerk and my successor have said, and I cannot tell you how much I have enjoyed the three years I have spent here.

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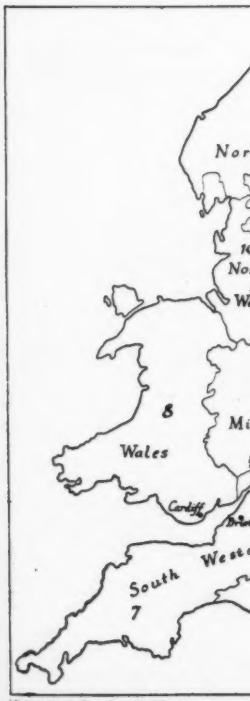

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Berkshire
Oxford
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Hereford
Worcester
Warwick
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Rut:
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Middx
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Cheshire
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Stafford
Salop
Monmouth

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Administrative Counties
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Regional Planning Organisation
Ministry of Town and
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1946
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6

Scheme Areas of the
Central Electricity Board
1931
NORTH EAST ENGLAND
MID EAST ENGLAND
NORTH WEST ENGLAND
NORTH WEST & WALES
CENTRAL ENGLAND
EAST ENGLAND
SOUTH WEST ENGLAND
SOUTH & WALES
SOUTH EAST ENGLAND

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1 Bootle
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3 Wigan
4 Bolton
5 Bury
6 Rochdale
7 Oldham
8 Huddersfield
9 Dewsbury
10 Warrington
11 Salford
12 Stockport
County Boroughs of England & Wales
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Bradford
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Burnley
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Kingston upon Hull
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Civil Defence Regions
1939 – 45
• Regional Headquarters
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Areas of Electricity Boards
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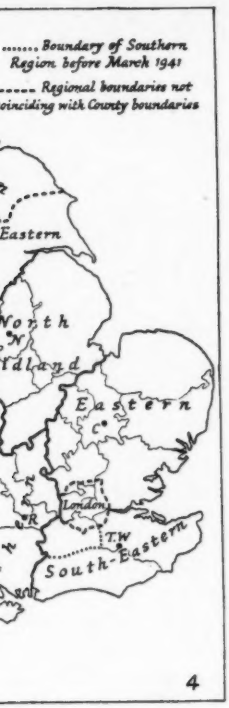
Northern
Yorkshire
Lancashire & Cheshire
North Midlands
West Midlands
Wales
South Midlands
South Western


..... Boundary of Southern Region before March 1941
----- Regional boundaries not coinciding with County boundaries
Eastern
Eastern
London
R
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South-Eastern

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Standard Regions
1946
• Regional Headquarters
Newcastle upon Tyne
Northern 1
East & West Ridings
Leeds 2
North Western
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Manchester
North Midland
Nottingham 3
Wales
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Midland
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Birmingham
Eastern
Cambridge 4
Cardiff
Bristol
Reading
London
London & South Eastern
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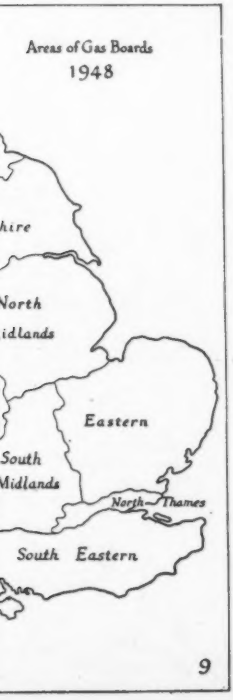
South Western
7
Southern 6

5


Areas of Gas Boards
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South Eastern

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Divisions of National Coal Board
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Regions of British Railways
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Areas of Regional
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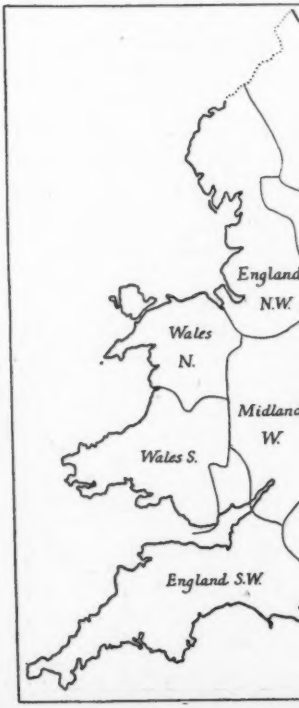
England N.W.
Wales N.
Midland W.
Wales S.
England S.W.

Regions proposed
by C.B. Fawcett
1942
• Regional Capital
Newcastle upon Tyne
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Planing Regions based on
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West Midlands
South Wales
Oxford Region
Metropolitan
West Country
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Hampshire
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Forecast Districts of the
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Post Office Regions
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MIDLAND
Birmingham
HOME COUNTIES REGION
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anning Regions based on
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Planning Regions proposed
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1941

• Regional Capital

..... Sub-divisions of Wales

----- Regional boundaries not coinciding with County boundaries

14

ost Office Regions
1939

Regional Headquarters

18

Telephone Areas

• Headquarters

19

Regions proposed
by G.D.H.Cole
1947
North
Tyneside
Eastern
Northern
Yorks
North
Gt Manchester
Merseyside
Western
North Midland
West
Gt Birmingham
Wales
Midland
East Midland
Eastern
East
Anglia
Gt London
Western
Southern
South Eastern
South
Western
15

Sub-regions proposed in
"Housing" as Housing Areas
1920
20